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DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE

Hydraulic and Excavation Tables

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NOTICE.

This book is published primarily for official use of the engineers of the United States Reclamation Service. Copies may be obtained by the public for $1.50 each. Address the Director, United States Reclamation Service, Washington, D. C.

PREFACE.

The first edition of the Hydraulic and Excavation Tables was issued by the United States Reclamation Service in 1905. Later revised editions were issued in 1909, 1913, and 1917. While compiled in the first instance with a view to the requirements of the engineers of the Reclamation Service, the book has had a considerable circulation among other engineers engaged in similar lines of work. Most of the tables have been computed especially for this publication and are available nowhere else in print. In order to make the series complete a few tables taken from other sources have been included, most of which have been extended or modified to conform to the conditions encountered on reclamation projects.

In the present edition new tables of functions of circular and horseshoe conduit sections running partially filled have been inserted, with tables giving velocity heads and discharges at critical depths. A table from which discharge of concrete pipe may be computed using the formula and coefficients recently developed by Fred C. Scobey is also inserted.

All reported errors have been checked and corrections made, and the thanks of the Service are extended to all those who by reporting errors or by making suggestions for improvement have cooperated in this revision. A continuance of this interest is earnestly solicited; all errors reported or suggestions made in the line of constructive criticism are welcomed, since it is only by the continued cooperation of users and publishers that the goal of an entirely reliable and adequtae handbook can be attained.

A. P. DAVIS,
Director.

WASHINGTON, D. C., *July 8, 1921.*

CONTENTS.

HYDRAULIC AND EXCAVATION TABLES.

EXPLANATION OF TABLES.

Tables 1 to 11.—Tables 1 to 11 give the values of the mean velocity of water in open channels computed from Kutter's formula:

$$v=\left\{\frac{\frac{1.811}{n}+41.6+\frac{.00281}{s}}{1+\left\{41.6+\frac{.00281}{s}\right\}\frac{n}{\sqrt{r}}}\right\}\sqrt{rs}.$$

The values of n, the coefficient of roughness, to be used in finding v, depend on the roughness of the materials forming the bed and banks of the channel, irregularities and imperfections in the bed or banks, the load of silt or detritus, curves, eddies, aquatic plants, and other conditions that tend to produce a retardation of flow. Experimental data on the subject are limited and the commonly accepted values of n for specific conditions must be considered as mere approximations. These approximate values, based on a consideration of the data available, are as follows:

$n=.010$ for clean, straight channels newly lined with planed boards carefully laid; neat cement plaster; glazed, coated and enameled surfaces in perfect order.

$n=.011$ for construction as above but with alignment consisting of long tangents joined by gentle curves; clean, straight metal flumes of the smooth interior type carrying clear water and in perfect order.

$n=.012$ for clean, straight and regular channels of planed boards not in perfect order due to inferior workmanship or age; unplaned boards newly and carefully laid; metal flumes of the smooth interior type for water carrying a small amount of silt or with clear water and gentle curvature in alignment; concrete linings having steel trowled surfaces of 1:1 mortar carrying water practically free from silt; sand and cement plaster; best and cleanest brickwork.

$n=.013$ for clean, regular channels of concrete having steel troweled surfaces of 1:1 mortar with a small amount of gentle curvature in alignment or carrying water with a small amount of silt; metal flumes of the smooth interior type having sharp curvature or used for water carrying a large amount of silt.

n=.014 for clean, regular channels of concrete having wooden troweled or formed surfaces of good construction, the alignment consisting of tangents connected by gentle curves; unplaned boards not in perfect order due to inferior workmanship or age.

n=.015 for construction as in the preceding case but with sharp curvature or with deposits of silt on the bottom of channel; straight and regular channels of ordinary brickwork; smooth stonework; foul and slightly tuberculated iron.

n=.020 for channels of fine gravel; rough set rubble; ruined masonry; or tuberculated iron; or for canals in earth, in good condition, lined with well-packed gravel, partly covered with sediment, and free from vegetation.

n=.0225 for canals in earth in fair condition lined with sediment and occasional patches of algæ, or composed of loose gravel without vegetation.

n=.025 for canals and rivers of tolerably uniform cross section, slope and direction in average condition; the water slopes being lined with sediment and minute algæ or composed of loose, coarse gravel.

n=.030 for canals and rivers in rather poor condition, having bed partially covered with débris, or having comparatively smooth sides and bed but a channel partially obstructed with grass, weeds, or aquatic plants.

n=.035 for canals and rivers in bad order and regimen, having the channel strewn with stones and detritus or about one-third full of vegetation.

Canals in earth with their channels half full of vegetation may have n=.040, and when two-thirds full of vegetation may have n=.050. In exceptional cases the value of n may reach .060.

EXAMPLE: Suppose the surface slope of a stream at a gaging station is 0.00050, or the fall is ½ foot per thousand feet (or 2.64 feet to the mile), the hydraulic radius (r) is 7.5 feet, and the condition of the stream is "in bad order and regimen."

Then on page 45 for n=0.035, slope=0.00050 and r=7.5, we find the mean velocity to be 3.78 feet per second.

Note.—To find velocities for slopes other than those given in this table, multiply the tabular velocity found in the column of "F= 52.80" by ten times the square root of the slope. The velocity thus obtained is accurate for slopes greater than 6 feet per mile, and approximate for slopes greater than 4 feet per mile.

Tables 12, 12a, 12b, and 12c.—Explanation of these tables appears on page 48d.

Table 13.—Table 13 gives the area and hydraulic radius of the commercial sizes of semicircular steel flumes flowing full and with various amounts of freeboard.

Table 14.—Table 14 gives the area and hydraulic radius of rectangular channels for various depths and bottom widths.

Tables 15 to 20.—Tables 15 to 20 give the top width, area, and hydraulic radius of trapezoidal channels for various center depths and bottom widths with side slopes of ½ to 1, 1 to 1, 1½ to 1, and 2 to 1 on both sides, with one side slope 1 to 1 and one side slope 1½ to 1, and with one side slope 2 to 1 and one side slope 1½ to 1.

Table 21.—Table 21 gives the discharges in cubic feet per second over Cipolletti weirs and suppressed thin-edged rectangular weirs for various lengths and depths of water on the crest. The formula from which this table is computed is $Q=3.367LH^{\frac{3}{2}}$, where Q is the discharge in cubic feet per second, L the length in feet of the crest of the weir, and H the depth in feet of water flowing over the weir.

The Cipolletti weir differs from the rectangular form in having side slopes of 4 vertical to 1 horizontal, instead of vertical sides. Its coefficient of contraction is unity and hence its discharge is more readily computed than that of the rectangular weir.

Since the discharge is proportional to the length of weir, the table may be used for weirs of any length by multiplying some value found in the table by the proper factor, or by moving decimal points and adding, but the tabular values are not accurate in case the head is greater than one-third the length of the weir.

EXAMPLE: Suppose the weir has a length of 345 feet and a depth of water on crest of 0.72 foot, the discharge would be equal to that of 3 weirs whose lengths are 300 feet, 40 feet, and 5 feet. On page 89, opposite figure ".72," in the column headed "Depth on crest," we have the following:

300 feet	=617	second-feet.
40 feet (1–10 of 400 feet)	= 82.3	second-feet.
5 feet (1–100 of 500 feet)	= 10.28	second-feet.
345 feet	709.58	second-feet.

Table 22.—Table 22 gives values of Herschel's coefficient n for computing the discharge of submerged weirs.

Table 23.—Table 23 gives the discharge per foot of length over sharp-crested vertical weirs, without end contractions, of heights 2, 4, 6, 8, 10, 20, and 30 feet, computed from Bazin's formula. Although this formula is based on data obtained from experiments with heads not greater than 1.64 feet, discharges for heads of 4 feet and less computed thereby agree within 2 per cent with those obtained by use of the Fteley and Stearns formula. The discharge given by this table is corrected for velocity of approach and the head to be used is that observed 16 feet or more upstream from the crest of the weir.

Tables 24 to 26.—Tables 24 to 26 give multipliers to be applied to quantities in Table 23 to determine the discharge over broad-crested weirs of various types and dimensions.

EXAMPLE: Suppose the discharge is to be computed over a weir of rectangular cross section that is 10 feet long, 12 feet high, 6 feet wide at crest, and has an observed head of 2.4 feet. Table 23 shows that for a height (p) of 12 feet and a head (h) of 2.4, the discharge is 12.42 second-feet. Table 24 shows that for a height (p) of 12 feet, a crest width (c) of 6 feet, and head (h) of 2.4 feet the multiplier is 0.797. Hence, the discharge is $12.42 \times 0.797 \times 10 = 99.0$ second-feet. With two end contractions the discharge would be $9.9\left(10 - \frac{2 \times 2.4}{10}\right) = 94.2$.

Tables 27 and 28.—Tables 27 and 28 give the discharge of standard and suppressed rectangular submerged orifices.

Table 29.—Table 29 gives the flow of water in second-feet and the velocity in feet per second in wood stave pipe, computed by the formula proposed by Fred C. Scobey in "The Flow of Water in Wood Stave Pipe," Bulletin 376, United States Department of Agriculture. This formula is based on a consideration of all recorded tests of flow in wood stave pipes, including many by the author himself. Its application meets (within 1 per cent) the mean of all velocity observations and the mean capacity of all wood pipes upon which experiments have been made, but being an averaging formula it gives results which are as likely to be too large as too small, and in exceptional cases may be in error as much as 15 per cent. The author recommends that "a very conservative factor of safety" [10 or 15 per cent] "should be used where a guaranteed capacity is to be attained."

Table 30.—Table 30 presents two sets of factors which may be multiplied together by slide rule or otherwise to give the discharge of concrete pipe by Scobey's formula (see Bulletin No. 852, Depart-

ture). Thus, for example, the discharge of a 6-inch under a head of 6 feet per 1,000 would be
278×2.4495=0.51 cubic feet per second.
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ble 33 gives theoretical velocities of flow for different

7.—Tables 34 to 37 give the volume of excavation per 100 feet of length for various center depths and uming the ground to be level transversely. The , is the difference between two triangular prisms.

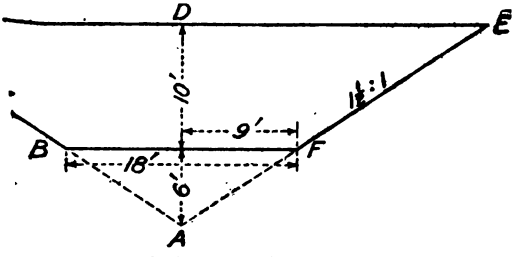

FIG. 1.—Ideal canal section.

In figure 1 is shown the cross section of a canal that has a bottom width of 18 feet and side slopes of 1½ to 1. The amount of material in the prism C B F E is equal to the volume of the prism A C E minus the volume of the prism A B F. As A C E has an altitude of 16 feet and A B F has an altitude of 6 feet, the volume of each for a length of 100 feet can be obtained from the table. Opposite 16 in Table 35 on page 116 is 1,422, which is the volume in cubic feet of A C E per 100 linear feet; opposite 6 is 200, which is the volume of A B F.

As C B F E=A C E−A B F
C B F E=1,422−200
=1,222

Table 23.—Table 23 gives the discharge per foot of length over sharp-crested vertical weirs, without end contractions, of heights 2, 4, 6, 8, 10, 20, and 30 feet, computed from Bazin's formula. Although this formula is based on data obtained from experiments with heads not greater than 1.64 feet, discharges for heads of 4 feet and less computed thereby agree within 2 per cent with those obtained by use of the Fteley and Stearns formula. The discharge given by this table is corrected for velocity of approach and the head to be used is that observed 16 feet or more upstream from the crest of the weir.

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ment of Agriculture). Thus, for example, the discharge of a 6-inch "wet mix" pipe under a head of 6 feet per 1,000 would be

$$0.2078 \times 2.4495 = 0.51 \text{ cubic feet per second.}$$

Table 31.—Table 31 gives the flow of water in second-feet and the velocity in feet per second in pipes based on the Hazen and Williams formula $v = c\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$, using a value of the coefficient $c = 100$. (See "Hydraulic Tables" by Williams and Hazen, 2d ed., 1911.) This value of c is recommended by the authors for 10-year-old riveted steel pipe and by the use of the multipliers given below the tables they may be made to cover a considerable range of materials and conditions.

Table 32.—Table 32 gives weights per foot of cast-iron pipe.

Table 33.—Table 33 gives theoretical velocities of flow for different heads.

Tables 34 to 37.—Tables 34 to 37 give the volume of excavation in cubic yards per 100 feet of length for various center depths and side slopes, assuming the ground to be level transversely. The volume required is the difference between two triangular prisms.

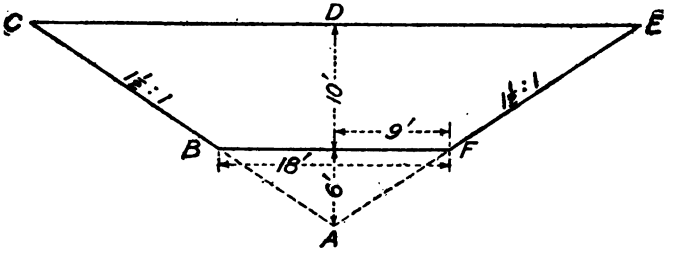

FIG. 1.—Ideal canal section.

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$$\text{As C B F E} = \text{A C E} - \text{A B F}$$
$$\text{C B F E} = 1{,}422 - 200$$
$$= 1{,}222$$

When working up quantities for canal excavation it is only necessary to subtract the volume below the bed once for each mile or for each 10 miles, thus making the use of the table much more rapid.

Tables 38 to 40.—Tables 38 to 40 give the volume of excavation in cubic yards per 100 feet of length, where the surface slopes transversely, for various center depths and side slopes. They differ from Tables 33 to 36 only in that the earth surface is sloping ground instead of being level transversely. The surface slope is expressed in per cent, a 10 per cent slope being 10 vertical to 100 horizontal.

Tables 41 and 42.—Table 41 gives three-halves powers of numbers from 0 to 1.499 by thousandths, and Table 42 gives three-halves powers of numbers from 1.50 to 19.99 by hundredths. These tables are designed especially for use in connection with formulas for discharge over weirs.

Table 43.—Table 43 gives the squares, cubes, square roots, cube roots, reciprocals, and area and circumference of circles.

Table 44.—Table 44 gives the difference of elevation in feet per mile for various angles of slope.

Table 45.—Table 45 gives the correction in feet for curvature and refraction.

Table 46.—Table 46 is designed for use in stadia work and gives the difference in elevation corresponding to specified slant distances for vertical angles of 0° to 20°. The horizontal distances corresponding to the slant distances are also given for various vertical angles.

EXAMPLE: With the instrument at A a vertical angle of 3° 10′ is observed on a point B which is distant 350 feet by stadia reading; find the difference in elevation of A and B and the horizontal distance AB. Opposite 3° 10′ in the first column of the table, 16.5 is found under a distance of 300 and 22.1 under a distance of 400; and interpolation for a distance of 350 feet gives 19.3 feet for the difference in elevation of A and B. Interpolation for 350 between the values in the 300 and the 400 distance columns of the horizontal distance lines at 3° and 4° gives, respectively, 349.0 and 348.2; and an additional interpolation gives, for an angle of 3° 10′ and a slant distance of 350, a horizontal distance of 348.9 The horizontal distance of AB is therefore 348.9 feet.

Table 47.—Table 47 gives values of c in the formula $v=c\sqrt{rs}$ for use in computing the mean velocity of the flow of streams.

Table 48.—Table 48 gives the average, limiting or mean weights per cubic foot for various substances.

Table 49.—Table 49 gives many convenient equivalents arranged under suitable headings.

Table 1.—*Velocity of water in feet per second, based on Kutter's formula; coefficient of roughness*

n = .010.

(F = fall in feet per mile; S = slope.)

R = area / wet per.	F = .264 S = .00005	F = .528 S = .00010	F = .792 S = .00015	F = 1.056 S = .00020	F = 1.320 S = .00025	F = 1.584 S = .00030	F = 1.848 S = .00035	F = 2.112 S = .00040	F = 2.376 S = .00045	F = 2.640 S = .00050	F = 2.904 S = .00055
0.2	.28	.44	.56	.67	.76	.84	.92	.99	1.05	1.11	1.17
0.4	.49	.76	.96	1.13	1.28	1.41	1.53	1.64	1.75	1.85	1.94
0.6	.68	1.02	1.29	1.51	1.70	1.88	2.04	2.19	2.33	2.46	2.58
0.8	.84	1.26	1.58	1.85	2.08	2.29	2.48	2.66	2.83	2.99	3.14
1.0	1.00	1.48	1.84	2.15	2.42	2.66	2.88	3.09	3.28	3.47	3.64
1.2	1.14	1.68	2.09	2.43	2.73	3.00	3.25	3.49	3.70	3.91	4.10
1.4	1.28	1.87	2.32	2.69	3.03	3.32	3.59	3.85	4.09	4.32	4.53
1.6	1.41	2.05	2.53	2.94	3.30	3.62	3.92	4.20	4.46	4.70	4.94
1.8	1.53	2.22	2.74	3.18	3.56	3.91	4.23	4.52	4.80	5.07	5.32
2.0	1.65	2.38	2.93	3.40	3.81	4.18	4.52	4.84	5.13	5.41	5.68
2.2	1.76	2.53	3.12	3.61	4.05	4.44	4.80	5.13	5.45	5.74	6.03
2.4	1.87	2.68	3.30	3.82	4.27	4.69	5.07	5.42	5.75	6.06	6.36
2.6	1.98	2.82	3.47	4.01	4.49	4.93	5.32	5.69	6.04	6.37	6.68
2.8	2.08	2.96	3.64	4.20	4.70	5.16	5.57	5.96	6.32	6.66	6.99
3.0	2.18	3.10	3.80	4.39	4.91	5.38	5.81	6.21	6.59	6.94	7.29
3.2	2.28	3.23	3.96	4.57	5.11	5.60	6.05	6.46	6.86	7.23	7.58
3.4	2.38	3.36	4.11	4.74	5.30	5.81	6.27	6.70	7.11	7.50	7.86
3.6	2.47	3.48	4.26	4.91	5.49	6.01	6.49	6.94	7.36	7.76	8.13
3.8	2.56	3.60	4.40	5.08	5.67	6.21	6.71	7.17	7.60	8.01	8.40
4.0	2.65	3.72	4.54	5.23	5.85	6.41	6.92	7.39	7.84	8.25	8.66
4.2	2.74	3.84	4.68	5.40	6.03	6.60	7.12	7.61	8.07	8.50	8.92
4.4	2.82	3.95	4.82	5.55	6.20	6.78	7.32	7.82	8.30	8.74	9.17
4.6	2.91	4.06	4.95	5.70	6.37	6.96	7.52	8.03	8.52	8.97	9.41
4.8	2.99	4.17	5.08	5.85	6.53	7.15	7.71	8.24	8.73	9.20	9.65
5.0	3.07	4.28	5.21	5.99	6.69	7.32	7.90	8.44	8.95	9.43	9.88
5.2	3.15	4.38	5.33	6.14	6.85	7.49	8.08	8.64	9.15	9.65	10.1
5.4	3.23	4.48	5.45	6.28	7.00	7.66	8.27	8.83	9.36	9.86	10.3
5.6	3.30	4.59	5.57	6.42	7.16	7.83	8.44	9.02	9.56	10.1	10.6
5.8	3.38	4.68	5.69	6.55	7.31	7.99	8.62	9.21	9.76	10.3	10.8
6.0	3.45	4.78	5.81	6.69	7.45	8.16	8.79	9.39	9.95	10.5	11.0
6.2	3.53	4.88	5.93	6.81	7.60	8.31	8.96	9.57	10.1	10.7	11.2
6.4	3.60	4.97	6.05	6.94	7.74	8.47	9.13	9.75	10.3	10.9	11.4
6.6	3.67	5.07	6.15	7.07	7.88	8.62	9.29	9.93	10.5	11.1	11.6
6.8	3.74	5.16	6.26	7.20	8.02	8.77	9.46	10.1	10.7	11.3	11.8
7.0	3.81	5.25	6.37	7.32	8.16	8.93	9.62	10.3	10.9	11.5	12.0
7.5	3.98	5.48	6.64	7.62	8.50	9.28	10.0	10.7	11.3	11.9	12.5
8.0	4.15	5.70	6.89	7.91	8.82	9.64	10.4	11.1	11.8	12.4	13.0
8.5	4.31	5.91	7.14	8.19	9.13	9.98	10.8	11.5	12.2	12.8	13.4
9.0	4.46	6.11	7.39	8.47	9.44	10.3	11.1	11.9	12.6	13.2	13.9
9.5	4.61	6.30	7.63	8.74	9.73	10.6	11.5	12.2	13.0	13.7	14.3
10.0	4.76	6.50	7.85	9.00	10.0	11.0	11.8	12.6	13.3	14.1	14.7

Table 1.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n =.010—Continued.

r = area / wet. per.	F=3.163 S=.00060	F=3.432 S=.00065	F=3.696 S=.00070	F=3.960 S=.00075	F=4.224 S=.00080	F=4.488 S=.00085	F=4.752 S=.00090	F=5.016 S=.00095	F=5.280 S=.00100	F=6.60 S=.00125
0.2	1.22	1.28	1.33	1.38	1.42	1.47	1.52	1.56	1.60	1.80
0.4	2.03	2.12	2.20	2.28	2.36	2.44	2.51	2.58	2.65	2.97
0.6	2.70	2.82	2.92	3.03	3.13	3.23	3.33	3.42	3.51	3.93
0.8	3.28	3.42	3.55	3.68	3.80	3.92	4.04	4.15	4.26	4.77
1.0	3.81	3.97	4.12	4.27	4.41	4.55	4.68	4.81	4.93	5.53
1.2	4.29	4.47	4.64	4.81	4.97	5.12	5.27	5.42	5.56	6.22
1.4	4.74	4.93	5.12	5.31	5.48	5.65	5.82	5.98	6.14	6.87
1.6	5.16	5.37	5.58	5.78	5.97	6.15	6.33	6.51	6.68	7.47
1.8	5.56	5.79	6.01	6.22	6.42	6.62	6.82	7.01	7.19	8.04
2.0	5.94	6.18	6.41	6.64	6.86	7.07	7.28	7.48	7.68	8.59
2.2	6.30	6.56	6.80	7.05	7.28	7.50	7.72	7.93	8.14	9.11
2.4	6.64	6.92	7.18	7.43	7.68	7.91	8.14	8.37	8.59	9.60
2.6	6.98	7.26	7.54	7.81	8.06	8.31	8.55	8.79	9.02	10.1
2.8	7.30	7.60	7.89	8.17	8.43	8.69	8.95	9.19	9.43	10.5
3.0	7.62	7.93	8.22	8.51	8.79	9.06	9.33	9.58	9.83	11.0
3.2	7.92	8.24	8.55	8.85	9.14	9.42	9.70	9.96	10.2	11.4
3.4	8.21	8.55	8.87	9.18	9.48	9.77	10.1	10.3	10.6	11.9
3.6	8.50	8.84	9.18	9.50	9.81	10.1	10.4	10.7	11.0	12.3
3.8	8.77	9.13	9.48	9.81	10.1	10.4	10.7	11.0	11.3	12.7
4.0	9.05	9.41	9.77	10.1	10.4	10.8	11.1	11.4	11.7	13.1
4.2	9.31	9.69	10.1	10.4	10.8	11.1	11.4	11.7	12.0	13.4
4.4	9.57	9.96	10.3	10.7	11.1	11.4	11.7	12.0	12.4	13.8
4.6	9.83	10.2	10.6	11.0	11.3	11.7	12.0	12.4	12.7	14.2
4.8	10.1	10.5	10.9	11.3	11.6	12.0	12.3	12.7	13.0	14.5
5.0	10.3	10.7	11.1	11.5	11.9	12.3	12.6	13.0	13.3	14.9
5.2	10.6	11.0	11.4	11.8	12.2	12.6	12.9	13.3	13.6	15.2
5.4	10.8	11.3	11.7	12.1	12.5	12.8	13.2	13.6	13.9	15.6
5.6	11.0	11.5	11.9	12.3	12.7	13.1	13.5	13.9	14.2	15.9
5.8	11.3	11.7	12.2	12.6	13.0	13.4	13.8	14.1	14.5	16.2
6.0	11.5	11.9	12.4	12.8	13.2	13.6	14.0	14.4	14.8	16.5
6.2	11.7	12.2	12.6	13.1	13.5	13.9	14.3	14.7	15.1	16.8
6.4	11.9	12.4	12.9	13.3	13.7	14.2	14.6	15.0	15.4	17.2
6.6	12.1	12.6	13.1	13.5	14.0	14.4	14.8	15.2	15.6	17.5
6.8	12.3	12.8	13.3	13.8	14.2	14.7	15.1	15.5	15.9	17.8
7.0	12.5	13.1	13.5	14.0	14.4	14.9	15.3	15.8	16.2	18.1
7.5	13.0	13.6	14.1	14.6	.....	.....	.....	.....	.....	.....
8.0	13.5	14.1	14.6	15.1	.....	.....	.....	.....	.....	.....
8.5	14.0	14.6	15.1	15.7	.....	.....	.....	.....	.....	.....
9.0	14.5	15.1	15.6	16.2	.....	.....	.....	.....	.....	.....
9.5	14.9	15.5	16.1	16.7	.....	.....	.....	.....	.....	.....
10.0	15.4	16.0	16.6	17.2	.....	.....	.....	.....	.....	.....

Table 1.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n =.010—Continued.

$r = \frac{\text{area}}{\text{wet per.}}$	F=7.92 S=.00150	F=9.24 S=.00175	F=10.56 S=.002	F=15.84 S=.003	F=21.12 S=.004	F=26.40 S=.005	F=31.68 S=.006	F=42.24 S=.008	F=52.80 S=.010
0.2	1.97	2.14	2.29	2.81	3.25	3.64	3 98	4.60	5.15
0.4	3.26	3.53	3.77	4.63	5.36	5.99	6 57	7.53	8.48
0.6	4.32	4.67	4.99	6.13	7.08	7.92	8 68	10.0	11.2
0.8	5.24	5.66	6.05	7.43	8.58	9.60	10.5	12.2	13.6
1.0	6.06	6.55	7.01	8.59	9.93	11.1	12.2	14.1	15.7
1.2	6.82	7.37	7.88	9.67	11.2	12.5	13.7	15.8	17.7
1.4	7.53	8.13	8.70	10.7	12.3	13.8	15.1	17.4	19.5
1.6	8.19	8.85	9.46	11.6	13.4	15.0	16.4	19.0	21.2
1.8	8.81	9.52	10.2	12.5	14.4	16.1	17.7	20.4	22.8
2.0	9.41	10.2	10.9	13.3	15.4	17.2	18.8	21.8	24.3
2.2	9.98	10.8	11.5	14.1	16.3	18.2	20.0	23.1	25.8
2.4	10.5	11.4	12.2	14.9	17.2	19.2	21.1	24.3	27.2
2.6	11.1	11.9	12.8	15.6	18.1	20.2	22.1	25.5	28.5
2.8	11.6	12.5	13.3	16.3	18.9	21.1	23.1	26.7	29.8
3.0	12.0	13.0	13.9	17.0	19.7	22.0	24.1	27.8	31.1
3.2	12.5	13.5	14.5	17.7	20.4	22.9	25.0	.....	.....
3.4	13.0	14.0	15.0	18.4	21.2	23.7	26.0	.....	.....
3.6	13.4	14.5	15.5	19.0	21.9	24.5	26.9	.....	.....
3.8	13.9	15.0	16.0	19.6	22.6	25.3	27.7	.....	.....
4.0	14.3	15.4	16.5	20.2	23.3	26.1	.....	.....	.....
4.2	14.7	15.9	17.0	20.8	24.0	26.8	.....	.....	.....
4.4	15.1	16.3	17.5	21.4	24.7	27.6	.....	.....	.....
4.6	15.5	16.8	17.9	21.9	25.3	.....	.....	.....	.....
4.8	15.9	17.2	18.4	22.5	25.9	.....	.....	.....	.....
5.0	16.3	17.6	18.8	23.0	26.6	.....	.....	.....	.....
5.2	16.7	18.0	19.2	23.5	.....	.....	.....	.....	.....
5.4	17.0	18.4	19.7	24.1	.....	.....	.....	.....	.....
5.6	17.4	18.8	20.1	.....	.....	.....	.....	.....	.....
5.8	17.7	19.2	20.5	.....	.....	.....	.....	.....	.....
6.0	18.1	19.5	.....	.....	.....	.....	.....	.....	.....
6.2	18.4	19.9	.....	.....	.....	.....	.....	.....	.....
6.4	18.8	20.3	.....	.....	.....	.....	.....	.....	.....
6.6	19.1	20.6	.....	.....	.....	.....	.....	.....	.....
6.8	19.4	21.0	.....	.....	.....	.....	.....	.....	.....
	19.8	21.3	.....	.....	.....	.....	.....	.....	.....

Table 2.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n=.011.

r = area / wet per.	F=.264 S=.00005	F=.528 S=.00010	F=.792 S=.00015	F=1.056 S=.00020	F=1.320 S=.00025	F=1.584 S=.00030	F=1.848 S=.00035	F=2.112 S=.00040	F=2.376 S=.00045	F=2.640 S=.00050	F=2.904 S=.00055
0.2	.24	.39	.49	.59	.67	.74	.81	.87	.93	.97	1.03
0.4	.43	.67	.85	1.00	1.13	1.25	1.36	1.46	1.56	1.64	1.73
0.6	.60	.91	1.15	1.35	1.52	1.68	1.82	1.95	2.08	2.20	2.31
0.8	.75	1.13	1.42	1.66	1.86	2.05	2.23	2.39	2.54	2.68	2.82
1.0	.89	1.33	1.66	1.93	2.17	2.39	2.59	2.78	2.95	3.12	3.27
1.2	1.03	1.51	1.88	2.19	2.46	2.71	2.93	3.14	3.34	3.52	3.70
1.4	1.15	1.68	2.09	2.43	2.73	3.00	3.25	3.48	3.69	3.89	4.09
1.6	1.27	1.84	2.29	2.66	2.98	3.27	3.54	3.79	4.03	4.25	4.46
1.8	1.38	2.00	2.47	2.87	3.22	3.53	3.82	4.09	4.34	4.58	4.81
2.0	1.49	2.15	2.65	3.07	3.45	3.78	4.09	4.38	4.65	4.90	5.14
2.2	1.60	2.29	2.82	3.27	3.66	4.02	4.35	4.65	4.93	5.20	5.46
2.4	1.70	2.43	2.99	3.46	3.87	4.25	4.59	4.91	5.21	5.49	5.77
2.6	1.79	2.56	3.15	3.64	4.08	4.47	4.83	5.17	5.48	5.78	6.06
2.8	1.89	2.69	3.30	3.82	4.27	4.68	5.06	5.41	5.74	6.05	6.34
3.0	1.98	2.81	3.45	3.99	4.46	4.89	5.28	5.65	5.99	6.31	6.62
3.2	2.07	2.93	3.60	4.15	4.64	5.09	5.50	5.88	6.23	6.57	6.89
3.4	2.16	3.05	3.74	4.31	4.82	5.28	5.70	6.10	6.47	6.82	7.15
3.6	2.25	3.17	3.88	4.47	5.00	5.47	5.91	6.32	6.70	7.06	7.40
3.8	2.33	3.28	4.01	4.62	5.17	5.65	6.11	6.53	6.92	7.29	7.65
4.0	2.41	3.39	4.14	4.77	5.33	5.83	6.30	6.73	7.14	7.52	7.89
4.2	2.49	3.50	4.27	4.92	5.49	6.01	6.49	6.93	7.35	7.74	8.13
4.4	2.57	3.60	4.39	5.06	5.65	6.18	6.67	7.13	7.56	7.96	8.35
4.6	2.65	3.70	4.51	5.20	5.80	6.35	6.86	7.32	7.76	8.18	8.57
4.8	2.73	3.80	4.63	5.33	5.95	6.52	7.03	7.51	7.96	8.39	8.79
5.0	2.80	3.90	4.75	5.47	6.10	6.68	7.21	7.70	8.16	8.60	9.01
5.2	2.88	4.00	4.87	5.60	6.25	6.84	7.38	7.88	8.35	8.80	9.22
5.4	2.95	4.10	4.98	5.73	6.39	7.00	7.55	8.06	8.54	9.00	9.43
5.6	3.02	4.19	5.09	5.86	6.53	7.15	7.71	8.24	8.73	9.19	9.64
5.8	3.09	4.28	5.20	5.98	6.67	7.30	7.87	8.41	8.91	9.38	9.84
6.0	3.16	4.37	5.31	6.11	6.81	7.45	8.03	8.58	9.09	9.57	10.0
6.2	3.23	4.46	5.42	6.23	6.94	7.60	8.19	8.75	9.27	9.76	10.2
6.4	3.29	4.55	5.52	6.35	7.07	7.74	8.35	8.91	9.44	9.94	10.4
6.6	3.36	4.64	5.63	6.46	7.20	7.88	8.50	9.07	9.61	10.1	10.6
6.8	3.43	4.72	5.73	6.58	7.33	8.02	8.65	9.23	9.78	10.3	10.8
7.0	3.49	4.81	5.83	6.69	7.46	8.15	8.80	9.39	9.95	10.5	11.0
7.5	3.65	5.01	6.08	6.97	7.77	8.49	9.16	9.77	10.3	10.9	11.4
8.0	3.80	5.21	6.32	7.24	8.07	8.82	9.51	10.2	10.7	11.3	11.9
8.5	3.95	5.41	6.55	7.50	8.36	9.13	9.85	10.5	11.1	11.7	12.3
9.0	4.10	5.60	6.77	7.76	8.64	9.44	10.2	10.9	11.5	12.1	12.7
9.5	4.24	5.78	6.99	8.01	8.92	9.74	10.5	11.2	11.9	12.5	13.1
10.0	4.38	5.96	7.21	8.25	9.19	10.0	10.8	11.5	12.2	12.9	13.5
11.0	4.65	6.31	7.62	8.72	9.70	10.6	11.4	12.2	12.9	13.6	14.2
12.0	4.91	6.65	8.01	9.17	10.2	11.2	12.0	12.8	13.6	14.3	14.9
13.0	5.15	6.97	8.39	9.60	10.7	11.7	12.6	13.4	14.2	14.9	15.6
14.0	5.39	7.28	8.76	10.0	11.1	12.2	13.1	14.0	14.8	15.6	16.3
15.0	5.63	7.58	9.12	10.4	11.6	12.6	13.6	14.5	15.4	16.2	16.9

Table 2.—*Velocity of water in feet per second based on Kutter's formula, coefficient of roughness*

n=.011—Continued.

r = area / wet per.	$\frac{1}{S}$ = 3.162 / F = .00060	$\frac{1}{S}$ = 3.432 / F = .00065	$\frac{1}{S}$ = 3.696 / F = .00070	$\frac{1}{S}$ = 3.960 / F = .00075	$\frac{1}{S}$ = 4.224 / F = .00080	$\frac{1}{S}$ = 4.488 / F = .00085	$\frac{1}{S}$ = 4.752 / F = .00090	$\frac{1}{S}$ = 5.016 / F = .00095	$\frac{1}{S}$ = 5.280 / F = .00100	$\frac{1}{S}$ = 6.60 / F = .00125
0.2	1.08	1.13	1.17	1.22	1.26	1.30	1.34	1.38	1.41	1.59
0.4	1.81	1.89	1.94	2.03	2.10	2.17	2.23	2.30	2.36	2.64
0.6	2.41	2.52	2.62	2.71	2.80	2.89	2.97	3.06	3.14	3.52
0.8	2.95	3.07	3.19	3.30	3.41	3.52	3.62	3.73	3.82	4.28
1.0	3.42	3.57	3.70	3.84	3.96	4.09	4.21	4.33	4.44	4.97
1.2	3.86	4.03	4.18	4.33	4.47	4.61	4.75	4.88	5.01	5.61
1.4	4.27	4.45	4.62	4.79	4.94	5.10	5.25	5.39	5.54	6.19
1.6	4.66	4.85	5.04	5.22	5.39	5.56	5.72	5.88	6.03	6.75
1.8	5.03	5.23	5.43	5.63	5.81	5.99	6.17	6.34	6.50	7.27
2.0	5.37	5.60	5.81	6.01	6.21	6.40	6.59	6.77	6.95	7.77
2.2	5.71	5.94	6.17	6.38	6.59	6.80	7.00	7.19	7.38	8.25
2.4	6.03	6.27	6.51	6.74	6.96	7.18	7.39	7.59	7.79	8.71
2.6	6.33	6.59	6.84	7.08	7.31	7.54	7.76	7.97	8.18	9.15
2.8	6.63	6.90	7.16	7.42	7.66	7.89	8.12	8.34	8.56	9.57
3.0	6.92	7.20	7.47	7.74	7.99	8.23	8.47	8.70	8.93	9.98
3.2	7.20	7.49	7.77	8.05	8.31	8.56	8.81	9.05	9.29	10.4
3.4	7.47	7.77	8.07	8.35	8.62	8.88	9.14	9.39	9.64	10.8
3.6	7.73	8.05	8.35	8.64	8.92	9.20	9.46	9.72	9.98	11.2
3.8	7.99	8.31	8.63	8.93	9.22	9.50	9.78	10.0	10.3	11.5
4.0	8.24	8.57	8.90	9.21	9.51	9.80	10.1	10.4	10.6	11.9
4.2	8.48	8.83	9.16	9.48	9.79	10.1	10.4	10.7	10.9	12.2
4.4	8.72	9.08	9.42	9.75	10.1	10.4	10.7	11.0	11.3	12.6
4.6	8.96	9.32	9.67	10.0	10.3	10.7	11.0	11.3	11.6	12.9
4.8	9.19	9.56	9.92	10.3	10.6	10.9	11.2	11.5	11.8	13.2
5.0	9.41	9.80	10.2	10.5	10.9	11.2	11.5	11.8	12.1	13.6
5.2	9.63	10.0	10.4	10.8	11.1	11.5	11.8	12.1	12.4	13.9
5.4	9.85	10.3	10.6	11.0	11.4	11.7	12.0	12.4	12.7	14.2
5.6	10.1	10.5	10.9	11.2	11.6	12.0	12.3	12.6	13.0	14.5
5.8	10.3	10.7	11.1	11.5	11.8	12.2	12.6	12.9	13.2	14.8
6.0	10.5	10.9	11.3	11.7	12.1	12.5	12.8	13.2	13.5	15.1
6.2	10.7	11.1	11.5	11.9	12.3	12.7	13.1	13.4	13.8	15.4
6.4	10.9	11.3	11.8	12.2	12.6	12.9	13.3	13.7	14.0	15.7
6.6	11.1	11.5	12.0	12.4	12.8	13.2	13.6	13.9	14.3	15.9
6.8	11.3	11.7	12.2	12.6	13.0	13.4	13.8	14.2	14.5	16.2
7.0	11.5	11.9	12.4	12.8	13.2	13.6	14.0	14.4	14.8	16.5
7.5	11.9	12.4	12.9	13.3	13.8	14.2	14.6	15.0	15.4	17.2
8.0	12.4	12.9	13.4	13.8	14.3	14.7	15.1	15.5	15.9	17.8
8.5	12.8	13.4	13.8	14.3	14.8	15.2	15.7	16.1	16.5	.....
9.0	13.3	13.8	14.3	14.8	15.3	15.7	16.2	16.6	17.1	.....
9.5	13.7	14.2	14.8	15.3	15.8	16.2	16.7	.....	.....	.....
10.0	14.1	14.6	15.2	15.7	16.2	16.7	17.2	.....	.....	.....
11.0	14.9	15.5	16.0	16.6	17.1	.....	.....	.....	.....	.....
12.0	15.6	16.2	16.8	.....	.....	.....	.....	.....	.....	.....
13.0	16.3	17.0	.....	.....	.....	.....	.....	.....	.....	.....
14.0	17.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 2.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n=.011—Continued.

$y = \frac{\text{area}}{\text{wet. per.}}$	$\frac{1}{n} = 7.92$ $n = .00150$	$\frac{1}{n} = 9.24$ $n = .00175$	$\frac{1}{n} = 10.56$ $n = .002$	$\frac{1}{n} = 15.84$ $n = .003$	$\frac{1}{n} = 21.12$ $n = .004$	$\frac{1}{n} = 26.40$ $n = .005$	$\frac{1}{n} = 31.68$ $n = .006$	$\frac{1}{n} = 42.24$ $n = .008$	$\frac{1}{n} = 52.80$ $n = .010$
0.2	1.74	1.88	2.02	2.48	2.87	3.21	3.52	4.07	4.55
0.4	2.90	3.14	3.36	4.12	4.77	5.33	5.85	6.75	7.56
0.6	3.86	4.17	4.47	5.48	6.33	7.08	7.76	8.97	10.0
0.8	4.70	5.08	5.43	6.66	7.70	8.61	9.44	10.9	12.2
1.0	5.45	5.89	6.30	7.73	8.93	9.99	10.9	12.6	14.1
1.2	6.15	6.64	7.11	8.71	10.1	11.3	12.3	14.2	15.9
1.4	6.79	7.34	7.85	9.61	11.1	12.4	13.6	15.7	17.6
1.6	7.40	8.00	8.55	10.5	12.1	13.5	14.8	17.1	19.2
1.8	7.97	8.61	9.21	11.3	13.0	14.6	16.0	18.5	20.6
2.0	8.52	9.20	9.84	12.1	13.9	15.6	17.1	19.7	22.0
2.2	9.04	9.77	10.4	12.8	14.8	16.5	18.1	20.9	23.4
2.4	9.54	10.3	11.0	13.5	15.6	17.4	19.1	22.1	24.7
2.6	10.0	10.8	11.6	14.2	16.4	18.3	20.1	23.2	25.9
2.8	10.5	11.3	12.1	14.8	17.2	19.2	21.0	24.2	27.1
3.0	10.9	11.8	12.6	15.5	17.9	20.0	21.9	25.3	28.3
3.2	11.4	12.3	13.1	16.1	18.6	20.8	22.8	26.3	29.4
3.4	11.8	12.8	13.6	16.7	19.3	21.6	23.6	27.3	30.5
3.6	12.2	13.2	14.1	17.3	20.0	22.3	24.4	28.2	31.5
3.8	12.6	13.6	14.6	17.9	20.6	23.0	25.2	29.1	32.6
4.0	13.0	14.1	15.0	18.4	21.2	23.7	26.0	30.0	33.6
4.2	13.4	14.5	15.5	18.9	21.9	24.4	26.8	.....	.....
4.4	13.8	14.9	15.9	19.5	22.5	25.1	27.5	.....	.....
4.6	14.1	15.3	16.3	20.0	23.1	25.8	28.3	.....	.....
4.8	14.5	15.7	16.7	20.5	23.7	26.4	29.0	.....	.....
5.0	14.9	16.0	17.1	21.0	24.2	27.1	29.7	.....	.....
5.2	15.2	16.4	17.5	21.5	24.8	.....	.....	.....	.....
5.4	15.5	16.8	17.9	22.0	25.4	.....	.....	.....	.....
5.6	15.9	17.1	18.3	22.4	25.9	.....	.....	.....	.....
5.8	16.2	17.5	18.7	22.9	26.4	.....	.....	.....	.....
6.0	16.5	17.8	19.1	23.3	26.9	.....	.....	.....	.....
6.2	16.8	18.2	19.4	.....	.....	.....	.....	.....	.....
6.4	17.2	18.5	19.8	.....	.....	.....	.....	.....	.....
6.6	17.5	18.8	20.1	.....	.....	.....	.....	.....	.....
6.8	17.8	19.2	20.5	.....	.....	.....	.....	.....	.....
7.0	18.1	19.5	20.8	.....	.....	.....	.....	.....	.....
7.5	18.8	20.3	.....	.....	.....	.....	.....	.....	.....
8.0	19.5	21.1	.....	.....	.....	.....	.....	.....	.....

Table 3.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .012.

r = area / wet per.	F = .264 S = .00005	F = .528 S = .00010	F = .792 S = .00015	F = 1.056 S = .00020	F = 1.320 S = .00025	F = 1.584 S = .00030	F = 1.848 S = .00035	F = 2.112 S = .00040	F = 2.376 S = .00045	F = 2.640 S = .00050	F = 2.904 S = .00055
0.2	.22	.34	.44	.52	.60	.66	.72	.77	.83	.87	.92
0.4	.39	.60	.75	.90	1.02	1.12	1.22	1.31	1.40	1.48	1.55
0.6	.54	.82	1.03	1.22	1.37	1.51	1.64	1.76	1.88	1.98	2.08
0.8	.68	1.02	1.28	1.50	1.69	1.86	2.02	2.16	2.30	2.43	2.55
1.0	.81	1.20	1.50	1.75	1.97	2.17	2.36	2.52	2.68	2.83	2.97
1.2	.93	1.37	1.71	1.99	2.23	2.46	2.66	2.85	3.03	3.20	3.36
1.4	1.05	1.53	1.90	2.21	2.48	2.73	2.95	3.16	3.36	3.55	3.72
1.6	1.15	1.68	2.08	2.42	2.71	2.98	3.23	3.46	3.67	3.87	4.06
1.8	1.26	1.82	2.26	2.62	2.94	3.22	3.49	3.73	3.96	4.18	4.38
2.0	1.36	1.96	2.42	2.81	3.15	3.45	3.73	4.00	4.24	4.47	4.69
2.2	1.46	2.09	2.58	2.99	3.35	3.67	3.97	4.25	4.51	4.76	4.99
2.4	1.55	2.22	2.73	3.16	3.54	3.88	4.20	4.49	4.77	5.03	5.27
2.6	1.64	2.34	2.88	3.33	3.73	4.09	4.42	4.73	5.01	5.29	5.55
2.8	1.73	2.46	3.02	3.49	3.91	4.29	4.63	4.96	5.25	5.54	5.81
3.0	1.82	2.58	3.16	3.65	4.09	4.47	4.84	5.17	5.49	5.78	6.07
3.2	1.90	2.69	3.30	3.81	4.26	4.66	5.04	5.38	5.71	6.02	6.31
3.4	1.98	2.80	3.43	3.96	4.42	4.84	5.23	5.59	5.93	6.25	6.55
3.6	2.06	2.91	3.55	4.10	4.58	5.02	5.42	5.79	6.14	6.47	6.79
3.8	2.14	3.01	3.68	4.24	4.74	5.19	5.60	5.99	6.36	6.69	7.02
4.0	2.22	3.11	3.80	4.37	4.89	5.35	5.78	6.18	6.55	6.91	7.24
4.2	2.29	3.21	3.92	4.52	5.04	5.52	5.96	6.37	6.75	7.11	7.46
4.4	2.37	3.31	4.04	4.65	5.19	5.68	6.13	6.55	6.94	7.32	7.67
4.6	2.44	3.40	4.15	4.78	5.33	5.84	6.30	6.78	7.13	7.52	7.88
4.8	2.51	3.50	4.26	4.91	5.47	5.99	6.46	6.90	7.32	7.71	8.09
5.0	2.58	3.59	4.37	5.03	5.61	6.14	6.63	7.08	7.50	7.90	8.29
5.2	2.65	3.68	4.48	5.15	5.75	6.29	6.78	7.25	7.68	8.09	8.48
5.4	2.72	3.77	4.58	5.27	5.88	6.43	6.94	7.41	7.86	8.28	8.68
5.6	2.78	3.86	4.69	5.39	6.01	6.58	7.09	7.58	8.03	8.46	8.87
5.8	2.85	3.94	4.79	5.51	6.14	6.72	7.25	7.74	8.20	8.64	9.06
6.0	2.91	4.03	4.89	5.62	6.27	6.85	7.39	7.90	8.37	8.81	9.24
6.2	2.98	4.11	4.99	5.74	6.39	6.99	7.54	8.06	8.53	8.99	9.42
6.4	3.04	4.20	5.09	5.85	6.52	7.12	7.68	8.20	8.69	9.16	9.60
6.6	3.10	4.28	5.19	5.96	6.64	7.26	7.83	8.36	8.85	9.33	9.77
6.8	3.15	4.36	5.28	6.07	6.76	7.39	7.97	8.41	9.01	9.49	9.95
7.0	3.20	4.44	5.38	6.17	6.88	7.51	8.10	8.65	9.17	9.66	10.1
7.5	3.35	4.63	5.60	6.43	7.17	7.83	8.44	9.01	9.55	10.1	10.5
8.0	3.49	4.82	5.83	6.68	7.44	8.13	8.77	9.36	9.91	10.4	10.9
8.5	3.64	5.00	6.04	6.93	7.72	8.43	9.08	9.70	10.3	10.8	11.3
9.0	3.79	5.17	6.25	7.17	7.98	8.72	9.39	10.0	10.6	11.2	11.7
9.5	3.93	5.35	6.46	7.40	8.24	9.00	9.69	10.3	11.0	11.5	12.1
10	4.06	5.52	6.66	7.63	8.49	9.27	9.99	10.7	11.3	11.9	12.5
11	4.31	5.85	7.04	8.06	8.97	9.79	10.5	11.3	11.9	12.6	13.2
12	4.55	6.16	7.41	8.48	9.43	10.3	11.1	11.8	12.5	13.2	13.8
13	4.78	6.46	7.77	8.89	9.88	10.8	11.6	12.4	13.1	13.8	14.5
14	5.01	6.75	8.11	9.28	10.3	11.3	12.1	12.9	13.7	14.4	15.1
15	5.23	7.03	8.44	9.65	10.7	11.7	12.6	13.4	14.2	15.0	15.7

Table 3.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .012—Continued.

$r = \frac{\text{area}}{\text{wet per.}}$	R=3.168 S=.00060	R=3.453 S=.00065	R=3.696 S=.00070	R=3.900 S=.00075	R=4.224 S=.00080	R=4.488 S=.00085	R=4.752 S=.00090	R=5.016 S=.00095	R=5.280 S=.00100	R=6.60 S=.00125
0.2	.96	1.01	1.05	1.08	1.12	1.16	1.19	1.23	1.26	1.42
0.4	1.63	1.70	1.76	1.83	1.89	1.95	2.01	2.07	2.12	2.38
0.6	2.18	2.27	2.36	2.45	2.53	2.61	2.69	2.76	2.84	3.18
0.8	2.67	2.78	2.89	2.99	3.09	3.19	3.28	3.37	3.46	3.88
1.0	3.11	3.24	3.36	3.48	3.60	3.71	3.82	3.93	4.02	4.51
1.2	3.51	3.66	3.80	3.93	4.07	4.19	4.32	4.44	4.55	5.10
1.4	3.89	4.05	4.21	4.35	4.50	4.64	4.78	4.92	5.04	5.64
1.6	4.25	4.42	4.59	4.75	4.91	5.06	5.21	5.36	5.50	6.15
1.8	4.58	4.77	4.96	5.13	5.30	5.46	5.63	5.78	5.93	6.64
2.0	4.90	5.11	5.30	5.49	5.67	5.85	6.02	6.18	6.34	7.10
2.2	5.21	5.43	5.63	5.83	6.03	6.21	6.39	6.57	6.74	7.54
2.4	5.51	5.74	5.95	6.16	6.37	6.56	6.75	6.94	7.12	7.96
2.6	5.79	6.03	6.26	6.48	6.69	6.90	7.10	7.30	7.49	8.37
2.8	6.07	6.32	6.56	6.79	7.01	7.23	7.44	7.64	7.84	8.77
3.0	6.34	6.60	6.84	7.08	7.32	7.54	7.76	7.97	8.18	9.15
3.2	6.59	6.86	7.12	7.37	7.62	7.85	8.08	8.30	8.51	9.52
3.4	6.85	7.13	7.39	7.65	7.90	8.15	8.38	8.61	8.84	9.88
3.6	7.09	7.38	7.66	7.93	8.19	8.44	8.68	8.92	9.15	10.2
3.8	7.33	7.63	7.91	8.19	8.46	8.72	8.97	9.22	9.46	10.6
4.0	7.57	7.87	8.17	8.45	8.73	9.00	9.26	9.51	9.75	10.9
4.2	7.79	8.11	8.41	8.71	8.99	9.26	9.53	9.79	10.1	11.2
4.4	8.01	8.34	8.65	8.95	9.25	9.53	9.80	10.1	10.3	11.6
4.6	8.23	8.56	8.89	9.20	9.50	9.79	10.1	10.3	10.6	11.9
4.8	8.44	8.79	9.12	9.43	9.74	10.0	10.3	10.6	10.9	12.2
5.0	8.65	9.00	9.34	9.67	9.98	10.3	10.6	10.9	11.2	12.5
5.2	8.86	9.22	9.56	9.90	10.2	10.5	10.8	11.1	11.4	12.8
5.4	9.06	9.43	9.78	10.1	10.5	10.8	11.1	11.4	11.7	13.1
5.6	9.26	9.63	9.99	10.3	10.7	11.0	11.3	11.6	11.9	13.3
5.8	9.45	9.84	10.2	10.6	10.9	11.2	11.6	11.9	12.2	13.6
6.0	9.65	10.0	10.4	10.8	11.1	11.5	11.8	12.1	12.4	13.9
6.2	9.84	10.2	10.6	11.0	11.3	11.7	12.0	12.4	12.7	14.2
6.4	10.0	10.4	10.8	11.2	11.6	11.9	12.3	12.6	12.9	14.4
6.6	10.2	10.6	11.0	11.4	11.8	12.1	12.5	12.8	13.1	14.7
6.8	10.4	10.8	11.2	11.6	12.0	12.3	12.7	13.0	13.4	14.9
7.0	10.6	11.0	11.4	11.8	12.2	12.6	12.9	13.3	13.6	15.2
7.5	11.0	11.4	11.9	12.3	12.7	13.1	13.4	13.8	14.2	15.8
8.0	11.4	11.9	12.3	12.8	13.2	13.6	14.0	14.3	14.7	16.4
8.5	11.8	12.3	12.8	13.2	13.6	14.1	14.5	14.8	15.2	17.0
9.0	12.2	12.7	13.2	13.7	14.1	14.5	14.9	15.3	15.7	17.6
9.5	12.6	13.1	13.6	14.1	14.5	15.0	15.4	15.8	16.2	.....
10	13.0	13.5	14.0	14.5	15.0	15.4	15.9	16.3	16.7	.....
11	13.7	14.3	14.8	15.3	.....	.....	.....	.....	.....	.....
12	14.4	15.0	15.6	16.1	.....	.....	.....	.....	.....	.....
13	15.1	15.7	16.3	16.8	.....	.....	.....	.....	.....	.....
14	15.7	16.4	17.0	17.6	.....	.....	.....	.....	.....	.....
15	16.4	17.0	17.6	18.3	.....	.....	.....	.....	.....	.....

Table 3.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .012—Continued.

r = area / wet per.	F = 7.93 S = .00158	F = 9.24 S = .00175	F = 10.56 S = .002	F = 15.84 S = .003	F = 21.12 S = .004	F = 26.40 S = .005	F = 31.68 S = .006	F = 42.24 S = .008	F = 52.80 S = .010
0.2	1.56	1.68	1.80	2.21	2.56	2.87	3.14	3.63	4.0
0.4	2.61	2.82	3.02	3.71	4.29	4.80	5.26	6.08	6.8
0.6	3.49	3.77	4.03	4.95	5.72	6.40	7.01	8.10	9.1
0.8	4.25	4.60	4.92	6.03	6.97	7.80	8.55	9.87	11.0
1.0	4.95	5.35	5.72	7.02	8.11	9.07	9.93	11.5	12.8
1.2	5.59	6.04	6.46	7.92	9.15	10.2	11.2	13.0	14.5
1.4	6.18	6.68	7.15	8.76	10.1	11.3	12.4	14.3	16.0
1.6	6.74	7.29	7.79	9.53	11.0	12.3	13.5	15.6	17.4
1.8	7.27	7.86	8.40	10.3	11.9	13.3	14.6	16.8	18.8
2.0	7.78	8.40	8.99	11.0	12.7	14.2	15.6	18.0	20.1
2.2	8.26	8.93	9.54	11.7	13.5	15.1	16.5	19.1	21.4
2.4	8.72	9.43	10.1	12.4	14.3	16.0	17.5	20.2	22.6
2.6	9.17	9.91	10.6	13.0	15.0	16.8	18.4	21.2	23.7
2.8	9.61	10.4	11.1	13.6	15.7	17.5	19.2	22.2	24.8
3.0	10.0	10.8	11.6	14.2	16.4	18.3	20.1	23.2	25.9
3.2	10.4	11.3	12.0	14.8	17.0	19.0	20.9	24.1	26.9
3.4	10.8	11.7	12.5	15.3	17.7	19.8	21.6	25.0	27.9
3.6	11.2	12.1	12.9	15.8	18.3	20.5	22.4	25.9	28.9
3.8	11.6	12.5	13.4	16.4	18.9	21.1	23.2	26.7	29.9
4.0	11.9	12.9	13.8	16.9	19.5	21.8	23.9	27.6	30.8
4.2	12.3	13.3	14.2	17.4	20.1	22.4	24.6	28.4	31.7
4.4	12.7	13.7	14.6	17.9	20.6	23.1	25.3	29.2	32.6
4.6	13.0	14.0	15.0	18.4	21.2	23.7	26.0	30.0	33.5
4.8	13.3	14.4	15.4	18.8	21.7	24.3	26.6	30.7	34.4
5.0	13.7	14.7	15.8	19.3	22.3	24.9	27.3	31.5	35.2
5.2	14.0	15.1	16.1	19.7	22.8	25.5	.....	.....	.....
5.4	14.3	15.4	16.5	20.2	23.3	26.1	.....	.....	.....
5.6	14.6	15.8	16.9	20.6	23.8	.....	.....	.....	.....
5.8	14.9	16.1	17.2	21.1	24.3	.....	.....	.....	.....
6.0	15.2	16.4	17.6	21.5	24.8	.....	.....	.....	.....
6.2	15.5	16.7	17.9	21.9	.....	.....	.....	.....	.....
6.4	15.8	17.1	18.2	22.3	.....	.....	.....	.....	.....
6.6	16.1	17.4	18.6	.....	.....	.....	.....	.....	.....
6.8	16.4	17.7	18.9	.....	.....	.....	.....	.....	.....
7.0	16.6	18.0	19.2	.....	.....	.....	.....	.....	.....
7.5	17.3	18.7	.....	.....	.....	.....	.....	.....	.....
8.0	18.0	19.4	.....	.....	.....	.....	.....	.....	.....
8.5	18.6	.....	.....	.....	.....	.....	.....	.....	.....

Table 4.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .013.

$r = \frac{\text{area}}{\text{wet. per.}}$	F = .264 S = .00005	F = .528 S = .00010	F = .792 S = .00015	F = 1.056 S = .00020	F = 1.320 S = .00025	F = 1.584 S = .00030	F = 1.848 S = .00035	F = 2.112 S = .00040	F = 2.376 S = .00045	F = 2.640 S = .00050
0.2	.20	.31	.40	.47	0.53	.60	.65	.70	.74	.79
0.4	.35	.54	.69	.81	0.92	1.02	1.11	1.19	1.27	1.34
0.6	.49	.75	.94	1.10	1.25	1.38	1.50	1.60	1.70	1.80
0.8	.62	.98	1.17	1.36	1.54	1.70	1.84	1.97	2.09	2.21
1.0	.74	1.10	1.37	1.60	1.80	1.98	2.15	2.31	2.45	2.58
1.2	.85	1.25	1.56	1.82	2.05	2.25	2.44	2.61	2.78	2.93
1.4	.96	1.40	1.74	2.02	2.28	2.50	2.71	2.90	3.08	3.25
1.6	1.06	1.54	1.91	2.22	2.49	2.74	2 96	3.17	3.37	3.55
1.8	1.16	1.67	2.07	2.40	2.69	2.96	3.20	3.43	3.64	3.83
2.0	1.25	1.80	2.23	2.58	2.89	3.18	3.44	3.68	3.90	4.11
2.2	1.34	1.92	2.37	2.75	3.08	3.38	3.66	3.91	4.15	4.37
2.4	1.43	2.04	2.52	2.91	3.26	3 58	3.87	4.14	4.39	4.63
2.6	1.51	2.16	2.66	3.07	3.44	3.77	4.08	4.36	4.62	4.87
2.8	1.59	2.27	2.79	3.22	3.61	3.96	4.27	4.57	4.85	5.10
3.0	1.67	2.38	2.92	3.37	3.77	4.13	4.46	4.77	5.06	5.34
3.2	1.75	2.48	3.04	3.51	3.93	4.32	4.65	4.97	5.27	5.53
3.4	1.83	2.58	3.17	3.65	4.09	4.48	4.83	5.16	5.48	5.77
3.6	1.90	2.68	3.28	3.79	4.24	4.64	5.01	5.35	5.68	5.98
3.8	1.98	2.78	3.40	3.92	4.38	4.80	5.18	5.54	5.87	6.18
4.0	2.05	2.88	3.52	4.05	4.53	4.96	5.35	5.71	6.06	6.38
4.2	2.12	2.97	3.63	4.18	4.67	5.11	5.51	5.89	6.25	6.58
4.4	2.19	3.06	3.74	4.30	4.80	5.26	5.68	6 06	6.43	6.77
4.6	2.26	3.15	3.84	4.42	4.94	5.40	5.83	6 23	6.60	6.96
4.8	2.32	3.24	3.95	4.54	5.07	5.55	5.99	6.39	6.78	7.14
5.0	2.39	3.32	4.05	4.66	5.20	5.69	6.14	6.56	6.95	7.32
5.2	2.45	3.41	4.15	4.78	5.33	5.83	6.29	6.71	7.12	7.50
5.4	2.52	3.49	4.25	4.89	5.46	5.97	6.44	6.87	7.28	7.67
5.6	2.58	3.58	4.35	5.00	5.58	6.10	6.58	7.02	7.44	7.84
5.8	2.64	3.66	4.45	5.10	5.70	6.23	6.72	7.19	7.60	8.01
6.0	2.70	3.74	4.54	5.22	5.82	6.36	6.86	7.32	7.76	8.17
6.2	2.76	3.82	4.63	5.32	5.94	6.49	7.00	7.47	7.91	8.33
6.4	2.82	3.89	4.72	5.43	6.05	6.62	7.13	7.61	8.07	8.49
6.6	2.88	3.97	4.82	5.53	6.17	6.74	7.26	7 75	8.22	8.65
6.8	2.94	4.04	4.90	5.63	6.28	6.86	7.40	7.89	8.36	8.80
7.0	8.00	4.12	4.99	5.73	6.39	6.98	7.52	8.03	8.51	8.96
7.5	3.17	4.30	5.20	5.98	6.66	7.28	7.84	8.36	8.86	9.33
8.0	3.28	4.48	5.42	6.21	6.92	7.56	8.15	8.69	9.21	9.70
8.5	3.40	4.65	5.62	6.44	7.18	7.84	8.45	9.01	9.55	10.0
9.0	3.56	4.81	5.82	6.67	7.43	8.11	8.74	9.32	9.87	10.4
9.5	3.66	4.98	6.01	6.89	7.67	8.37	9.02	9.62	10.2	10.7
10	3.78	5.14	6.20	7.10	7.91	8.63	9.30	9.91	10.5	11.0
11	4.02	5.44	6.56	7.51	8.36	9.12	9.82	10.5	11.1	11.7
12	4.25	5.74	6.91	7.90	8.80	9.59	10.3	11.0	11.7	12.3
13	4.47	6.02	7.24	8.28	9.22	10.0	10.8	11.5	12.2	12.8
14	4.68	6.29	7.57	8.64	9.62	10.5	11.3	12.0	12.8	13.4
15	4.89	6.56	7.88	9.00	10.0	10.9	11.7	12.5	13.3	13.9

Table 4.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness.*

n = .013—Continued.

$r = \frac{\text{area}}{\text{wet. per.}}$	$\frac{2.904}{s} = .00055$	$\frac{3.168}{s} = .00060$	$\frac{3.432}{s} = .00065$	$\frac{3.696}{s} = .00070$	$\frac{3.960}{s} = .00075$	$\frac{4.224}{s} = .00080$	$\frac{4.488}{s} = .00085$	$\frac{4.752}{s} = .00090$	$\frac{5.016}{s} = .00095$	$\frac{5.280}{s} = .00100$
0.2	.83	.87	0.90	.94	.98	1.01	1.04	1.07	1.10	1.13
0.4	1.41	1.47	1.54	1.60	1.66	1.71	1.77	1.82	1.87	1.92
0.6	1.89	1.98	2.06	2.14	2.22	2.30	2.37	2.44	2.53	2.58
0.8	2.32	2.43	2.53	2.63	2.73	2.82	2.91	2.99	3.08	3.16
1.0	2.71	2.84	2.96	3.07	3.18	3.29	3.39	3.49	3.59	3.68
1.2	3.08	3.21	3.35	3.48	3.60	3.73	3.84	3.95	4.06	4.17
1.4	3.41	3.56	3.71	3.86	4.00	4.13	4.26	4.38	4.50	4.62
1.6	3.73	3.89	4.06	4.21	4.36	4.51	4.65	4.78	4.92	5.05
1.8	4.03	4.21	4.38	4.55	4.72	4.87	5.02	5.17	5.31	5.45
2.0	4.32	4.51	4.70	4.87	5.05	5.22	5.38	5.53	5.69	5.84
2.2	4.59	4.80	5.00	5.18	5.37	5.55	5.72	5.88	6.05	6.20
2.4	4.86	5.07	5.28	5.48	5.68	5.87	6.04	6.22	6.40	6.56
2.6	5.11	5.34	5.56	5.77	5.98	6.18	6.36	6.54	6.73	6.90
2.8	5.36	5.59	5.82	6.04	6.26	6.47	6.66	6.86	7.05	7.24
3.0	5.59	5.84	6.08	6.31	6.54	6.76	6.96	7.16	7.36	7.55
3.2	5.82	6.08	6.33	6.57	6.81	7.03	7.24	7.45	7.66	7.86
3.4	6.05	6.32	6.58	6.82	7.07	7.30	7.52	7.74	7.96	8.16
3.6	6.27	6.55	6.82	7.07	7.32	7.57	7.79	8.02	8.24	8.45
3.8	6.48	6.77	7.05	7.31	7.57	7.83	8.06	8.29	8.52	8.74
4.0	6.69	6.99	7.27	7.55	7.82	8.08	8.31	8.55	8.79	9.02
4.2	6.90	7.20	7.50	7.78	8.05	8.32	8.57	8.82	9.06	9.29
4.4	7.10	7.41	7.71	8.00	8.28	8.56	8.81	9.07	9.32	9.56
4.6	7.29	7.61	7.92	8.22	8.51	8.79	9.05	9.31	9.57	9.82
4.8	7.48	7.81	8.13	8.43	8.74	9.02	9.29	9.56	9.82	10.1
5.0	7.67	8.01	8.34	8.65	8.95	9.25	9.52	9.80	10.1	10.3
5.2	7.86	8.20	8.54	8.85	9.17	9.47	9.75	10.0	10.3	10.6
5.4	8.04	8.39	8.73	9.06	9.38	9.69	9.97	10.3	10.5	10.8
5.6	8.21	8.58	8.93	9.26	9.59	9.90	10.2	10.5	10.8	11.0
5.8	8.39	8.76	9.12	9.46	9.79	10.1	10.4	10.7	11.0	11.3
6.0	8.56	8.94	9.30	9.65	9.99	10.3	10.6	10.9	11.2	11.5
6.2	8.73	9.11	9.49	9.84	10.2	10.5	10.8	11.1	11.4	11.7
6.4	8.90	9.29	9.67	10.0	10.4	10.7	11.0	11.4	11.7	12.0
6.6	9.07	9.46	9.85	10.2	10.6	10.9	11.2	11.6	11.9	12.2
6.8	9.23	9.38	10.0	10.4	10.8	11.1	11.4	11.8	12.1	12.4
7.0	9.39	9.80	10.2	10.6	10.9	11.3	11.6	12.0	12.3	12.6
7.5	9.78	10.2	10.6	11.0	11.4	11.8	12.1	12.5	12.8	13.1
8.0	10.2	10.6	11.0	11.4	11.8	12.2	12.6	13.0	13.3	13.6
8.5	10.5	11.0	11.4	11.8	12.3	12.7	13.0	13.4	13.8	14.1
9.0	10.9	11.4	11.8	12.2	12.7	13.1	13.5	13.9	14.2	14.6
9.5	11.2	11.7	12.2	12.6	13.1	13.5	13.9	14.3	14.7	15.1
10.	11.6	12.1	12.6	13.0	13.5	13.9	14.3	14.7	15.2	15.5
11	12.2	12.8	13.3	13.8	14.3	14.7	15.2	15.6	16.0	.....
12	12.9	13.4	14.0	14.5	15.0	15.5	15.9	16.4	16.8	.....
13	13.5	14.0	14.6	15.1	15.7	16.2	16.7	17.1	17.6	.....
14	14.0	14.7	15.2	15.8	16.4	16.9	17.4	17.9	18.4	.....
15	14.6	15.2	15.8	16.4	17.0	17.6	18.1	18.6	19.1	.....

Table 4.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n=.013—Continued.

area / wet. per r =	6.60 .00125 = F s	7.92 .00150 = F s	9.24 .00175 = F s	10.56 .002 = F s	15.84 .003 = F s	21.13 .004 = F s	26.40 .005 = F s	31.68 .006 = F s	42.24 .008 = F s	52.80 .010 = F s
0.2	1.27	1.40	1.51	1.62	2 00	2.30	2.58	2.83	3.27	3.65
0.4	2.16	2.36	2.56	2.74	3.36	3.89	4.36	4.77	5.51	6.16
0.6	2.89	3.17	3.43	3.67	4.50	5.20	5.83	6.38	7.37	8.24
0.8	3.54	3.88	4.19	4.49	5.51	6.36	7 13	7.81	9.02	10.1
1.0	4.13	4.52	4.89	5.23	6.42	7.41	8.30	9.10	10.5	11.7
1.2	4.67	5.12	5.53	5.92	7.26	8.38	9.38	10.3	11.9	13.2
1.4	5.18	5.67	6.13	6.56	8.04	9.28	10.4	11.4	13.1	14.7
1.6	5.65	6.19	6.69	7.16	8.77	10.1	11 3	12.4	14.3	16.0
1.8	6.10	6.68	7.22	7.72	9.47	10.9	12.2	13.4	15.5	17.3
2.0	6.53	7.16	7.73	8.27	10.1	11.7	13.1	14.3	16.6	18.5
2.2	6.95	7.61	8.22	8.79	10.8	12.4	13.9	15.2	17.6	19.6
2.4	7.34	8.04	8.69	9.29	11.4	13.1	14.7	16.1	18 6	20.8
2.6	7.72	8.46	9.14	9.77	12.0	13.8	1o 5	16.9	19.6	21.8
2.8	8.09	8.86	9.57	10.2	12.5	14.5	16 2	17.7	20 5	22.9
3.0	8.45	9.25	9.98	10.7	13.1	15.1	16.9	18.5	21.4	23.9
3.2	8.79	9.63	10.4	11.1	13.6	15.7	17.6	19.3	22.2	24.8
3.4	9.13	10.0	10.8	11.5	14.1	16 3	18.3	20 0	23.1	25.8
3.6	9.46	10.3	11.2	11.9	14.6	16.9	18 9	20.7	23.9	26.7
3.8	9.78	10.7	11.6	12.4	15.1	17.5	19.6	21.4	24.7	27.6
4.0	10.1	11.0	11.9	12.8	15.6	18.0	20.2	22.1	25.5	28.5
4.2	10.4	11.4	12.3	13.1	16 1	18.6	20.8	22.8	26.3	29.3
4.4	10.7	11.7	12 6	13.5	16.5	19 1	21.4	23.4	27 0	30.2
4.6	11.0	12.0	13.0	13.8	17.0	19.6	21.9	24.0	27 7	.....
4.8	11.3	12.3	13.3	14.2	17.4	20.1	22.5	24.7	28.5	.....
5.0	11.6	12.6	13.6	14.6	17.9	20.6	23.1	25.3	29.2	.....
5.2	11.8	13.0	14.0	14.9	18.3	21.1	23.6	25.9	29.9	.....
5.4	12.1	13.2	14.3	15.3	18.7	21.6	24.2	26.5	30.5	.....
5.6	12.4	13.5	14.6	15.6	19.1	22.1	24.7	27 0	.....	.....
5.8	12.6	13.8	14.9	15.9	19 5	22.5	25.2	27.6	.....	.....
6.0	12.9	14.1	15.2	16.3	19.9	23.0	25.7	28.2	.....	.....
6.2	13.1	14.4	15.5	16.6	20.3	23.4	26.2	28.7	.....	.....
6.4	13.4	14.6	15.8	16.9	20.7	23.9	26.7	29.3	.....	.....
6.6	13.6	14.9	16.1	17 2	21.1	24.3	27.2	29.8	.....	.....
6.8	13.9	15.2	16.4	17 5	21.4	24.8	27.7	30.3	.....	.....
7.0	14.1	15.4	16.7	17.8	21.8	25.2	28.2	.....	.....	.....
7.5	14.7	16.1	17 4	18.6	22.7	26.2	29.3	.....	.....	.....
8.0	15.3	16 7	18.0	19 3	23.6	27.2	30.4	.....	.....	.....
8.5	15.8	17.3	18.7	20 0	24.4	28.2	.....	.....	.....	.....
9.0	16.3	17.9	19.3	20.6	25.2	29.1	.....	.....	.....	.....
9.5	16.9	18 5	19.9	21.3	26 0	30 0	.....	.....	.....	.....
10.	17.4	19.0	20.5	21.9	26.8	30.9	.....	.....	.....	.....

Table 5.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .014.

$r = \frac{\text{area}}{\text{wet. per.}}$	.304 = = .00005 Fall ÷ 6000	.528 = = .00010 Fall ÷ 3000	.769 = = .00015 Fall ÷ 2000	1.056 = = .00020 Fall ÷ 1500	1.320 = = .00025 Fall ÷ 1200	1.584 = = .00030 Fall ÷ 1000	1.848 = = .00035 Fall ÷ 857	2.112 = = .00040 Fall ÷ 750	2.376 = = .00045 Fall ÷ 667	2.640 = = .00050 Fall ÷ 600
0.2	.18	.28	.36	.43	.48	.54	.59	.68	.67	.71
0.4	.32	.49	.63	.74	.84	.93	1.01	1.08	1.15	1.22
0.6	.46	.68	.86	1.01	1.14	1.26	1.37	1.47	1.56	1.65
0.8	.57	.85	1.07	1.25	1.41	1.56	1.69	1.81	1.92	2.03
1.0	.68	1.01	1.26	1.47	1.66	1.82	1.98	2.12	2.25	2.38
1.2	.78	1.15	1.44	1.68	1.89	2.08	2.25	2.40	2.56	2.70
1.4	.88	1.29	1.60	1.87	2.10	2.31	2.50	2.67	2.84	3.00
1.6	.98	1.42	1 76	2.05	2.30	2.53	2.73	2.93	3.11	3.28
1.8	1.07	1.54	1.91	2.23	2.49	2.74	2.96	3.17	3.36	3.55
2.0	1.15	1.66	2.06	2.39	2.68	2.94	3.18	3.40	3.61	3.81
2.2	1.24	1.78	2.20	2.54	2.86	3.13	3.38	3.62	3.84	4.05
2.4	1.32	1.89	2.33	2.70	3.02	3.32	3.58	3.83	4.07	4.29
2.6	1.40	2.00	2.46	2.84	3.19	3.50	3.78	4.04	4.29	4.52
2.8	1.48	2.10	2.59	2.99	3.35	3.67	3.96	4.23	4.49	4.74
3.0	1.55	2.20	2.71	3.13	3.50	3.84	4.14	4.43	4.70	4.95
3.2	1.63	2.30	2.82	3.26	3.65	4.00	4.32	4.61	4.89	5.16
3.4	1.70	2.40	2.94	3.39	3.80	4.16	4.48	4.79	5.09	5.36
3.6	1.77	2.49	3.05	3.52	3.94	4.31	4.65	4.97	5.28	5.56
3.8	1.84	2.59	3.16	3.65	4.08	4.46	4.82	5.14	5.46	5.75
4.0	1.91	2.67	3.27	3.77	4.21	4.61	4.97	5.31	5.64	5.94
4.2	1.97	2.76	3.38	3.89	4.35	4.75	5.13	5.48	5.81	6.12
4.4	2.04	2.85	3.48	4.00	4.47	4.90	5.28	5.64	5.98	6.30
4.6	2.10	2.93	3.58	4.12	4.60	5.03	5.43	5.79	6.15	6.48
4.8	2.17	3.02	3.68	4.23	4.73	5.17	5.57	5.95	6.31	6.65
5.0	2.23	3.10	3.77	4.34	4.85	5.30	5.72	6.10	6.47	6.82
5.2	2.29	3.18	3.87	4.45	4.97	5.43	5.86	6.25	6.63	6.98
5.4	2.35	3.26	3.96	4.55	5.09	5.56	5.99	6.40	6.78	7.15
5.6	2.41	3.33	4.06	4.66	5.20	5.68	6.13	6.54	6.94	7.31
5.8	2.47	3.41	4.15	4.76	5.32	5.81	6.26	6.68	7.09	7.47
6.0	2.52	3.49	4.23	4.87	5.43	5.93	6.39	6.82	7.24	7.62
6.2	2.58	3.56	4.32	4.96	5.54	6.05	6.52	6.96	7.38	7.77
6.4	2.64	3.63	4.41	5.06	5.65	6.16	6.65	7.10	7.52	7.92
6.6	2.69	3.69	4.50	5.16	5.76	6.29	6.78	7.23	7.66	8.07
6.8	2.75	3.77	4.58	5.25	5.86	6.40	6.90	7.36	7.80	8.22
7.0	2.80	3.85	4.66	5.35	5.97	6.51	7.02	7.49	7.94	8.36
7.5	2.93	4.02	4.87	5.58	6.22	6.79	7.32	7.81	8.28	8.72
8.0	3.06	4.18	5.06	5.80	6.47	7.06	7.61	8.12	8.60	9.06
8.5	3.19	4.35	5.26	6.02	6.71	7.32	7.89	8.41	8.92	9.39
9.0	3.31	4.50	5.44	6.23	6.95	7.58	8.16	8.70	9.22	9.71
9.5	3.43	4.66	5.62	6.44	7.18	7.82	8.43	8.99	9.52	10.0
10	3.55	4.81	5.80	6.64	7.40	8.07	8.69	9.27	9.82	10.3
11	3.77	5.10	6.15	7.08	7.83	8.58	9.19	9.80	10.4	10.9
12	3.99	5.38	6.47	7.40	8.24	8.98	9.67	10.3	10.9	11.5
13	4.20	5.65	6.79	7.76	8.64	9.41	10.1	10.8	11.4	12.0
14	4.40	5.90	7.10	8.10	9.02	9.82	10.6	11.3	11.9	12.6
15	4.60	6.16	7.39	8.44	9.39	10.2	11.0	11.7	12.4	13.1

Table 5.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .014—Continued.

area / wet. per. = r	2.904 .00055 = s = Fs/2	3.168 .00060 = s = Fs/2	3.432 .00065 = s = Fs/2	3.696 .00070 = s = Fs/2	3.960 .00075 = s = Fs/2	4.224 .00080 = s = Fs/2	4.488 .00085 = s = Fs/2	4.752 .00090 = s = Fs/2	5.016 .00095 = s = Fs/2	5.280 .00100 = s = Fs/2
0.2	.75	.79	.82	.85	.88	.92	.95	.98	1.00	1.03
0.4	1.29	1.34	1.40	1.46	1.51	1.56	1.61	1.66	1.71	1.75
0.6	1.74	1.82	1.89	1.96	2.04	2.11	2.18	2.24	2.30	2.36
0.8	2.14	2.23	2.32	2.42	2.50	2.59	2.67	2.75	2.83	2.90
1.0	2.50	2.61	2.72	2.82	2.93	3.03	3.12	3.22	3.30	3.39
1.2	2.84	2.96	3.09	3.20	3.32	3.43	3.54	3.64	3.74	3.84
1.4	3.15	3.29	3.43	3.56	3.69	3.81	3.93	4.04	4.16	4.26
1.6	3.45	3.60	3.75	3.89	4.03	4.17	4.30	4.42	4.54	4.66
1.8	3.73	3.89	4.05	4.21	4.36	4.50	4.65	4.78	4.91	5.04
2.0	4.00	4.18	4.35	4.51	4.67	4.83	4.98	5.12	5.26	5.40
2.2	4.26	4.44	4.62	4.80	4.97	5.14	5.30	5.45	5.60	5.74
2.4	4.50	4.70	4.89	5.08	5.26	5.44	5.60	5.76	5.92	6.07
2.6	4.75	4.95	5.15	5.35	5.54	5.72	5.90	6.07	6.24	6.39
2.8	4.97	5.19	5.40	5.61	5.81	6.00	6.19	6.36	6.54	6.70
3.0	5.20	5.43	5.64	5.86	6.07	6.27	6.46	6.65	6.83	7.00
3.2	5.41	5.65	5.88	6.10	6.32	6.53	6.73	6.92	7.11	7.29
3.4	5.63	5.87	6.11	6.34	6.57	6.78	6.99	7.19	7.39	7.58
3.6	5.83	6.09	6.33	6.57	6.81	7.03	7.25	7.46	7.66	7.85
3.8	6.04	6.30	6.55	6.80	7.04	7.27	7.50	7.72	7.93	8.12
4.0	6.23	6.50	6.76	7.02	7.27	7.51	7.74	7.96	8.18	8.38
4.2	6.42	6.70	6.97	7.23	7.49	7.74	7.98	8.20	8.43	8.64
4.4	6.61	6.90	7.17	7.44	7.71	7.96	8.21	8.44	8.67	8.89
4.6	6.79	7.09	7.37	7.65	7.92	8.18	8.43	8.68	8.91	9.14
4.8	6.97	7.28	7.57	7.85	8.13	8.40	8.66	8.90	9.15	9.38
5.0	7.15	7.46	7.76	8.05	8.34	8.61	8.88	9.13	9.38	9.61
5.2	7.33	7.64	7.95	8.25	8.54	8.82	9.09	9.35	9.60	9.85
5.4	7.50	7.82	8.13	8.44	8.74	9.03	9.30	9.57	9.82	10.1
5.6	7.66	8.00	8.32	8.63	8.94	9.23	9.51	9.78	10.0	10.3
5.8	7.83	8.17	8.49	8.81	9.13	9.43	9.71	9.99	10.3	10.5
6.0	7.99	8.34	8.67	9.00	9.32	9.62	9.91	10.2	10.5	10.7
6.2	8.15	8.50	8.84	9.17	9.50	9.81	10.1	10.4	10.7	10.9
6.4	8.31	8.67	9.01	9.35	9.68	10.0	10.3	10.6	10.9	11.2
6.6	8.46	8.83	9.18	9.52	9.87	10.2	10.5	10.8	11.1	11.4
6.8	8.62	8.99	9.35	9.69	10.0	10.4	10.7	11.0	11.3	11.6
7.0	8.77	9.15	9.51	9.87	10.2	10.6	10.9	11.2	11.5	11.8
7.5	9.14	9.53	9.91	10.3	10.6	11.0	11.3	11.6	12.0	12.3
8.0	9.50	9.91	10.3	10.7	11.1	11.4	11.8	12.1	12.4	12.7
8.5	9.84	10.3	10.7	11.1	11.5	11.8	12.2	12.5	12.9	13.2
9.0	10.2	10.6	11.0	11.4	11.8	12.2	12.6	13.0	13.3	13.7
9.5	10.5	11.0	11.4	11.8	12.2	12.6	13.0	13.4	13.8	14.1
10	10.8	11.3	11.8	12.2	12.6	13.0	13.4	13.8	14.2	14.5
11	11.5	11.9	12.4	12.9	13.3	13.8	14.2	14.6	15.0	.....
12	12 0	12.6	13.1	13.5	14.0	14.5	14.9	15.8	15.8	.....
13	12.6	13.2	13.7	14.2	14.7	15.2	15.6	16.1	16.5	.....
14	13.2	13.7	14.3	14.8	15.3	15.8	16.3	16.8	17.2	.....
15	13 7	14.3	14 8	15.4	16.0	16.5	17.0	17.4	17.9	.....

Table 5.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n=.014—Continued.

$r = \frac{\text{area}}{\text{wet. per}}$	0.60 .00125	7.93 .00150	9.24 .00175	10.56 .002	15.84 .003	21.13 .004	26.40 .005	31.68 .006	42.24 .008	52.80 .010
	F s	F s	F s	F s	F s	F s	F s	F s	F s	F s
0.2	1.15	1.27	1 37	1.47	1.81	2.09	2.34	2.56	2.96	3.32
0.4	1.96	2.15	2.33	2.50	3.07	3.55	3.97	4.35	5.03	5.62
0.6	2.64	2.90	3.14	3.36	4.12	4.77	5.33	5.84	6.75	7.55
0.8	3.22	3.54	3 82	4.10	5.02	5.81	6.50	7.12	8.22	9.20
1.0	3.77	4.13	4.47	4.78	5.86	6.78	7.58	8.31	9.59	10.7
1.2	4.30	4.71	5 09	5.45	6.68	7.72	8.64	9.46	10.9	12.2
1.4	4.77	5.28	5.65	6.04	7.41	8 57	9.58	10.5	12.1	13.6
1.6	5.21	5.71	6.17	6.60	8.10	9.36	10.5	11.5	13.2	14.8
1.8	5.68	6.17	6.67	7.14	8 75	10.1	11.3	12.4	14.3	16.0
2.0	6.04	6.62	7.15	7.65	9.37	10.8	12.1	13.3	15.3	17.1
2.2	6.42	7.04	7.60	8.13	9.97	11.5	12 9	14.1	16.3	18.2
2.4	6.79	7.44	8.04	8.60	10.5	12.2	13.6	14.9	17.2	19.3
2.6	7.15	7.84	8.46	9.05	11.1	12.8	14.3	15.7	18.1	20.3
2.8	7.50	8.21	8.87	9.49	11.6	13.4	15.0	16.4	19.0	21.2
3.0	7.83	8.58	9.26	9.91	12.1	14.0	15.7	17.2	19.8	22.2
3.2	8.16	8.98	9.65	10.3	12.6	14.6	16.3	17.9	20.6	23.1
3.4	8.47	9.28	10.0	10.7	13.1	15.2	17.0	18.6	21.4	24.0
3.6	8.78	9.62	10.4	11.1	13.6	15.7	17.6	19.2	22.2	24.8
3.8	9.08	9.95	10.7	11.5	14.1	16.2	18.2	19.9	23.0	25.7
4.0	9.37	10.3	11.1	11.8	14.5	16.8	18.7	20.5	23.7	26.5
4.2	9.66	10.6	11.4	12.2	15.0	17.3	19.3	21.2	24.4	27.3
4.4	9.94	10.9	11.7	12.6	15.4	17.8	19.9	21.8	25.1	28.1
4.6	10.2	11.2	12.1	12.9	15.8	18.2	20.4	22.4	25.8	28.8
4.8	10.5	11.5	12.4	13.2	16.2	18.7	21.0	22.9	26.5	29.6
5.0	10.7	11.8	12.7	13.6	16.6	19.2	21.5	23.5	27.1	30.4
5.2	11.0	12.1	13.0	13.9	17.0	19.7	22.0	24.1	27.8	.....
5.4	11.3	12.3	13.3	14.2	17.4	20.1	22.5	24.6	28.5	.....
5.6	11.5	12.6	13.6	14.5	17.8	20.6	23.0	25.2	29.1	.....
5.8	11.8	12.9	13.9	14.9	18.2	21.0	23.5	25.7	29.7	.....
6.0	12.0	13.1	14.2	15.2	18.6	21.4	24.0	26.2	30.3	.....
6.2	12.2	13.4	14.5	15.4	18.9	21.8	24.4	26.8	.....	.....
6.4	12.5	13.7	14.7	15.8	19.3	22.3	24.9	27.3	.....	.....
6.6	12.7	13.9	15.0	16.0	19.6	22.7	25.4	27.8	.....	.....
6.8	12.9	14.2	15.3	16.3	20.0	23.1	25.8	28.3	.....	.....
7.0	13.2	14.4	15.5	16.6	20.3	23.5	26.3	28.8	.....	.....
7.5	13.7	15.0	16.2	17.3	21.2	24.4	27.4	30.0	.....	.....
8.0	14.2	15.6	16.8	18.0	22.0	25.4	28.4	.....	.....	.....
8.5	14.8	16.1	17.4	18.6	22.8	26.3	29.4	.....	.....	.....
9.0	15.3	16.7	18.0	19.3	23.6	27.2	30.4	.....	.....	.....
9.5	15.8	17.2	18.6	19.9	24.3	28.1	.....	.....	.....	.....
10	16.2	17.8	19.2	20.5	25.1	28.9	.....	.....	.....	.....

Table 6.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .015.

r = area / wet per.	F = .264 S = .00005	F = .528 S = .00010	F = .792 S = .00015	F = 1.056 S = .00020	F = 1.320 S = .00025	F = 1.584 S = .00030	F = 1.848 S = .00035	F = 2.112 S = .00040	F = 2.376 S = .00045	F = 2.640 S = .00050
0.2	.16	.26	.33	.39	.44	.49	.54	.58	.61	.65
0.4	.29	.45	.57	.68	.77	.85	.93	1.00	1.06	1.12
0.6	.41	.63	.79	.93	1.05	1.16	1.26	1.35	1.44	1.52
0.8	.52	.79	.99	1.15	1.30	1.43	1.56	1.67	1.78	1.88
1.0	.63	.93	1.16	1.36	1.53	1.68	1.83	1.96	2.09	2.20
1.2	.72	1.07	1.33	1.55	1.74	1.92	2.08	2.23	2.37	2.50
1.4	.82	1.20	1.49	1.73	1.94	2.14	2.32	2.48	2.63	2.78
1.6	.91	1.32	1.64	1.90	2.13	2.35	2.54	2.72	2.89	3.05
1.8	.99	1.44	1.78	2.06	2.32	2.54	2.75	2.94	3.13	3.30
2.0	1.07	1.55	1.91	2.22	2.49	2.73	2.95	3.16	3.36	3.54
2.2	1.15	1.66	2.04	2.37	2.65	2.91	3.15	3.37	3.58	3.77
2.4	1.23	1.76	2.17	2.51	2.81	3.09	3.34	3.57	3.79	3.99
2.6	1.31	1.86	2.29	2.65	2.97	3.25	3.52	3.76	3.99	4.21
2.8	1.38	1.96	2.41	2.79	3.12	3.42	3.69	3.95	4.19	4.42
3.0	1.45	2.06	2.52	2.92	3.26	3.58	3.86	4.13	4.38	4.62
3.2	1.52	2.15	2.63	3.04	3.40	3.73	4.03	4.30	4.57	4.81
3.4	1.59	2.24	2.74	3.17	3.54	3.88	4.19	4.47	4.75	5.00
3.6	1.65	2.33	2.85	3.29	3.67	4.02	4.34	4.64	4.92	5.19
3.8	1.72	2.42	2.95	3.41	3.80	4.16	4.50	4.81	5.10	5.37
4.0	1.78	2.50	3.05	3.52	3.93	4.31	4.65	4.96	5.26	5.55
4.2	1.85	2.58	3.15	3.63	4.06	4.44	4.79	5.12	5.43	5.72
4.4	1.91	2.67	3.25	3.74	4.18	4.57	4.93	5.27	5.59	5.89
4.6	1.97	2.75	3.35	3.85	4.30	4.70	5.07	5.42	5.75	6.06
4.8	2.03	2.82	3.44	3.96	4.42	4.83	5.21	5.57	5.90	6.22
5.0	2.09	2.90	3.53	4.06	4.53	4.96	5.35	5.71	6.05	6.38
5.2	2.14	2.98	3.62	4.16	4.64	5.08	5.48	5.85	6.20	6.53
5.4	2.20	3.05	3.71	4.27	4.76	5.20	5.61	5.99	6.35	6.69
5.6	2.26	3.13	3.80	4.36	4.87	5.32	5.74	6.13	6.49	6.84
5.8	2.31	3.20	3.88	4.46	4.97	5.44	5.86	6.26	6.64	6.99
6.0	2.37	3.27	3.97	4.56	5.08	5.56	5.99	6.40	6.77	7.14
6.2	2.42	3.34	4.05	4.65	5.18	5.67	6.11	6.52	6.91	7.28
6.4	2.47	3.41	4.13	4.75	5.29	5.78	6.23	6.65	7.05	7.42
6.6	2.53	3.48	4.21	4.84	5.39	5.89	6.35	6.78	7.18	7.56
6.8	2.58	3.55	4.29	4.93	5.49	6.00	6.47	6.90	7.31	7.70
7.0	2.64	3.61	4.37	5.02	5.59	6.10	6.58	7.02	7.44	7.84
7.5	2.76	3.77	4.57	5.24	5.83	6.36	6.86	7.32	7.76	8.17
8.0	2.88	3.93	4.75	5.45	6.06	6.62	7.14	7.62	8.07	8.50
8.5	3.00	4.09	4.93	5.65	6.29	6.87	7.40	7.90	8.37	8.82
9.0	3.11	4.24	5.11	5.85	6.51	7.10	7.66	8.17	8.66	9.13
9.5	3.23	4.39	5.28	6.05	6.73	7.34	7.91	8.44	8.94	9.42
10	3.34	4.53	5.45	6.24	6.94	7.57	8.16	8.71	9.22	9.70
11	3.55	4.81	5.78	6.61	7.35	8.02	8.63	9.22	9.75	10.3
12	3.76	5.07	6.09	6.96	7.74	8.44	9.09	9.70	10.3	10.8
13	3.96	5.32	6.39	7.30	8.11	8.84	9.52	10.2	10.8	11.3
14	4.15	5.57	6.68	7.63	8.47	9.24	9.95	10.6	11.2	11.8
15	4.34	5.81	6.96	7.95	8.82	9.62	10.4	11.0	11.7	12.3

Table 6.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .015—Continued.

r = area / wet per.	F=2.904 S=.00055	F=3.168 S=.00060	F=3.432 S=.00065	F=3.696 S=.00070	F=3.960 S=.00075	F=4.224 S=.00080	F=4.488 S=.00085	F=4.752 S=.00090	F=5.016 S=.00095	F=5.280 S=.00100
0.2	.68	.72	.75	.78	.81	.84	.86	.89	.91	.94
0.4	1.18	1.23	1.29	1.34	1.39	1.43	1.48	1.52	1.57	1.61
0.6	1.60	1.67	1.74	1.81	1.88	1.94	2.00	2.06	2.12	2.18
0.8	1.97	2.06	2.15	2.23	2.31	2.39	2.46	2.54	2.61	2.68
1.0	2.31	2.41	2.52	2.62	2.71	2.80	2.89	2.97	3.05	3.13
1.2	2.62	2.74	2.86	2.97	3.07	3.18	3.28	3.37	3.47	3.55
1.4	2.92	3.05	3.18	3.30	3.42	3.53	3.64	3.75	3.86	3.95
1.6	3.20	3.34	3.48	3.61	3.74	3.85	3.98	4.10	4.22	4.33
1.8	3.46	3.62	3.77	3.91	4.05	4.18	4.31	4.44	4.56	4.68
2.0	3.71	3.88	4.04	4.20	4.34	4.49	4.63	4.76	4.89	5.02
2.2	3.96	4.13	4.30	4.47	4.63	4.78	4.93	5.07	5.21	5.35
2.4	4.19	4.38	4.56	4.73	4.90	5.06	5.21	5.37	5.51	5.66
2.6	4.41	4.61	4.80	4.99	5.16	5.33	5.49	5.65	5.81	5.96
2.8	4.63	4.84	5.04	5.23	5.41	5.59	5.76	5.93	6.09	6.25
3.0	4.84	5.06	5.27	5.47	5.66	5.84	6.02	6.20	6.37	6.53
3.2	5.05	5.27	5.49	5.70	5.90	6.09	6.28	6.46	6.64	6.81
3.4	5.25	5.48	5.70	5.92	6.13	6.33	6.52	6.71	6.90	7.07
3.6	5.44	5.68	5.92	6.14	6.35	6.56	6.76	6.96	7.15	7.33
3.8	5.63	5.88	6.12	6.35	6.57	6.79	7.00	7.20	7.40	7.59
4.0	5.82	6.07	6.32	6.55	6.79	7.02	7.23	7.43	7.64	7.84
4.2	6.00	6.26	6.52	6.76	7.00	7.23	7.45	7.66	7.87	8.08
4.4	6.18	6.45	6.71	6.96	7.20	7.44	7.67	7.89	8.10	8.31
4.6	6.35	6.63	6.90	7.16	7.41	7.65	7.88	8.11	8.33	8.55
4.8	6.52	6.81	7.08	7.35	7.60	7.85	8.09	8.33	8.55	8.77
5.0	6.69	6.98	7.26	7.54	7.80	8.05	8.30	8.54	8.77	9.00
5.2	6.85	7.15	7.44	7.72	7.99	8.25	8.50	8.75	8.98	9.22
5.4	7.01	7.32	7.62	7.90	8.18	8.44	8.70	8.95	9.19	9.43
5.6	7.17	7.49	7.79	8.08	8.36	8.63	8.90	9.15	9.40	9.64
5.8	7.33	7.65	7.96	8.25	8.54	8.82	9.09	9.35	9.60	9.85
6.0	7.48	7.81	8.12	8.43	8.72	9.00	9.28	9.54	9.80	10.1
6.2	7.63	7.97	8.29	8.60	8.90	9.18	9.47	9.74	10.0	10.3
6.4	7.78	8.12	8.45	8.76	9.07	9.36	9.65	9.93	10.2	10.5
6.6	7.93	8.27	8.61	8.93	9.24	9.54	9.83	10.1	10.4	10.7
6.8	8.07	8.43	8.77	9.09	9.41	9.72	10.0	10.3	10.6	10.9
7.0	8.21	8.57	8.92	9.24	9.57	9.90	10.2	10.5	10.8	11.1
7.5	8.56	8.94	9.30	9.63	9.98	10.3	10.6	10.9	11.2	11.5
8.0	8.90	9.29	9.66	10.0	10.4	10.7	11.0	11.4	11.7	12.0
8.5	9.23	9.64	10.0	10.4	10.8	11.1	11.4	11.8	12.1	12.4
9.0	9.55	9.97	10.4	10.8	11.1	11.5	11.8	12.2	12.5	12.8
9.5	9.86	10.3	10.7	11.1	11.5	11.9	12.2	12.6	12.9	13.2
10	10.2	10.6	11.0	11.4	11.8	12.2	12.6	13.0	13.3	13.6
11	10.8	11.2	11.7	12.1	12.5	.....	.....	.....	.....	.....
12	11.3	11.8	12.3	12.7	13.2	.....	.....	.....	.....	.....
13	11.9	12.4	12.9	13.3	13.8	.....	.....	.....	.....	.....
14	12.4	12.9	13.4	13.9	14.4	.....	.....	.....	.....	.....
15	12.9	13.4	14.0	14.5	15.0	.....	.....	.....	.....	.....

Table 6.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .015—Continued.

r = area / wet per.	F = 6.60 S = .00125	F = 7.92 S = .00150	F = 9.24 S = .00175	F = 10.56 S = .002	F = 15.84 S = .003	F = 21.12 S = .004	F = 26.40 S = .005	F = 31.68 S = .006	F = 42.24 S = .008	F = 52.80 S = .010
0.2	1.05	1.16	1.25	1.34	1.65	1.91	2.13	2.34	2.70	3.02
0.4	1.80	1.98	2.14	2.29	2.82	3.26	3.64	3.99	4.61	5.16
0.6	2.44	2.68	2.89	3.10	3.80	4.39	4.91	5.38	6.22	6.96
0.8	3.00	3.29	3.56	3.81	4.67	5.40	6.04	6.61	7.64	8.54
1.0	3.51	3.85	4.16	4.45	5.46	6.31	7.06	7.73	8.93	9.99
1.2	3.98	4.37	4.72	5.05	6.19	7.15	8.00	8.77	10.1	11.3
1.4	4.43	4.85	5.24	5.61	6.87	7.94	8.88	9.73	11.2	12.6
1.6	4.85	5.31	5.74	6.13	7.52	8.69	9.71	10.6	12.3	13.7
1.8	5.24	5.74	6.20	6.63	8.13	9.39	10.5	11.5	13.3	14.9
2.0	5.62	6.16	6.65	7.11	8.72	10.1	11.3	12.3	14.2	15.9
2.2	5.98	6.55	7.08	7.57	9.27	10.7	12.0	13.1	15.2	16.9
2.4	6.33	6.93	7.49	8.01	9.81	11.3	12.7	13.9	16.0	17.9
2.6	6.66	7.30	7.89	8.43	10.3	11.9	13.3	14.6	16.9	18.9
2.8	6.99	7.66	8.27	8.84	10.8	12.5	14.0	15.3	17.7	19.8
3.0	7.30	8.00	8.64	9.24	11.3	13.1	14.6	16.0	18.5	20.7
3.2	7.61	8.34	9.01	9.63	11.8	13.6	15.2	16.7	19.3	21.5
3.4	7.91	8.66	9.36	10.0	12.3	14.2	15.8	17.3	20.0	22.4
3.6	8.20	8.98	9.70	10.4	12.7	14.7	16.4	18.0	20.7	23.2
3.8	8.48	9.29	10.0	10.7	13.1	15.2	17.0	18.6	21.4	24.0
4.0	8.76	9.60	10.4	11.1	13.6	15.7	17.5	19.2	22.1	24.8
4.2	9.03	9.89	10.7	11.4	14.0	16.1	18.0	19.8	22.8	25.5
4.4	9.29	10.2	11.0	11.8	14.4	16.6	18.6	20.3	23.5	26.2
4.6	9.55	10.5	11.3	12.1	14.8	17.1	19.1	20.9	24.1	27.0
4.8	9.81	10.7	11.6	12.4	15.2	17.5	19.6	21.5	24.8	27.7
5.0	10.1	11.0	11.9	12.7	15.6	18.0	20.1	22.0	25.4	28.4
5.2	10.3	11.3	12.2	13.0	15.9	18.4	20.6	22.5	26.0	29.1
5.4	10.5	11.5	12.5	13.3	16.3	18.8	21.0	23.1	26.6	29.8
5.6	10.8	11.8	12.7	13.6	16.7	19.2	21.5	23.6	27.2	30.4
5.8	11.0	12.1	13.0	13.9	17.0	19.7	22.0	24.1	27.8	31.1
6.0	11.2	12.3	13.3	14.2	17.4	20.1	22.4	24.6	28.4	31.7
6.2	11.5	12.6	13.6	14.5	17.7	20.5	22.9	25.1	28.9	32.3
6.4	11.7	12.8	13.8	14.8	18.1	20.9	23.3	25.5	29.5	33.0
6.6	11.9	13.0	14.1	15.0	18.4	21.2	23.7	26.0	30.0	33.6
6.8	12.1	13.3	14.3	15.3	18.7	21.6	24.2	26.5	30.6	34.2
7.0	12.3	13.5	14.6	15.6	19.1	22.0	24.6	26.9	31.1	34.8
7.5	12.9	14.1	15.2	16.3	19.9	.....	.....	.....	.....	.....
8.0	13.4	14.6	15.8	16.9	20.6	.....	.....	.....	.....	.....
8.5	13.8	15.2	16.4	17.5	.....	.....	.....	.....	.....	.....
9.0	14.3	15.7	16.9	18.1	.....	.....	.....	.....	.....	.....
9.5	14.8	16.2	17.5	18.7	.....	.....	.....	.....	.....	.....
10.0	15.2	16.7	18.0	19.2	.....	.....	.....	.....	.....	.....

Table 7.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .020.

r = area / wet per.	S = .264 / S = .00005	S = .528 / S = .00010	S = .792 / S = .00015	S = 1.056 / S = .00020	S = 1.320 / S = .00025	S = 1.584 / S = .00030	S = 1.848 / S = .00035	S = 2.112 / S = .00040	S = 2.376 / S = .00045	S = 2.640 / S = .00050
0.2	.11	.17	.22	.27	.30	.33	.36	.39	.42	.44
0.4	.21	.32	.40	.47	.54	.59	.65	.69	.74	.78
0.6	.29	.44	.56	.66	.74	.82	.89	.96	1.02	1.08
0.8	.37	.56	.70	.82	.93	1.03	1.11	1.19	1.27	1.35
1.0	.45	.67	.84	.98	1.10	1.21	1.32	1.41	1.50	1.59
1.2	.52	.77	.96	1.12	1.26	1.39	1.51	1.62	1.72	1.81
1.4	.59	.87	1.08	1.26	1.41	1.56	1.69	1.81	1.92	2.03
1.6	.66	.96	1.20	1.39	1.56	1.72	1.86	1.99	2.11	2.22
1.8	.73	1.05	1.30	1.52	1.70	1.87	2.02	2.17	2.30	2.43
2.0	.79	1.14	1.41	1.64	1.84	2.01	2.18	2.33	2.48	2.61
2.2	.85	1.23	1.51	1.75	1.96	2.16	2.33	2.49	2.65	2.79
2.4	.91	1.31	1.61	1.86	2.09	2.29	2.48	2.65	2.81	2.97
2.6	.97	1.39	1.70	1.97	2.21	2.42	2.62	2.80	2.97	3.13
2.8	1.03	1.46	1.80	2.08	2.33	2.55	2.76	2.95	3.12	3.30
3.0	1.09	1.54	1.89	2.18	2.44	2.68	2.89	3.09	3.28	3.45
3.2	1.14	1.61	1.97	2.28	2.55	2.79	3.02	3.23	3.42	3.61
3.4	1.19	1.68	2.06	2.38	2.66	2.91	3.14	3.36	3.56	3.76
3.6	1.25	1.75	2.14	2.47	2.76	3.03	3.27	3.49	3.70	3.90
3.8	1.30	1.82	2.23	2.57	2.87	3.14	3.39	3.62	3.84	4.05
4.0	1.35	1.89	2.31	2.66	2.97	3.25	3.51	3.75	3.97	4.19
4.2	1.40	1.96	2.38	2.75	3.07	3.36	3.62	3.87	4.10	4.33
4.4	1.45	2.02	2.46	2.83	3.16	3.46	3.73	3.99	4.23	4.46
4.6	1.50	2.08	2.54	2.92	3.26	3.56	3.85	4.11	4.35	4.59
4.8	1.54	2.15	2.61	3.00	3.35	3.66	3.95	4.22	4.48	4.72
5.0	1.59	2.21	2.68	3.09	3.44	3.76	4.06	4.34	4.60	4.84
5.2	1.63	2.27	2.76	3.17	3.53	3.86	4.17	4.45	4.72	4.97
5.4	1.68	2.33	2.83	3.25	3.62	3.96	4.27	4.56	4.83	5.09
5.6	1.73	2.39	2.90	3.33	3.71	4.05	4.37	4.67	4.95	5.21
5.8	1.77	2.45	2.97	3.41	3.80	4.15	4.47	4.78	5 06	5.33
6.0	1.82	2.51	3.03	3.48	3.88	4.24	4.57	4.88	5.17	5.45
6.2	1.86	2.56	3.10	3.56	3.96	4.33	4.67	4.98	5.28	5.56
6.4	1.90	2.61	3.17	3.63	4.05	4.42	4.77	5.09	5.39	5.68
6.6	1.94	2.67	3.23	3.71	4.13	4.51	4.86	5.19	5.50	5.79
6.8	1.99	2.73	3.30	3.78	4.21	4.60	4.95	5.29	5.60	5.90
7.0	2.03	2.79	3.36	3.86	4.29	4.68	5.05	5.40	5.70	6.01
7.5	2.13	2.92	3.51	4.03	4.48	4.89	5.27	5.63	5.96	6.27
8.0	2.23	3.04	3.66	4.20	4.67	5.10	5.49	5.86	6.21	6.53
8.5	2.33	3.16	3.81	4.36	4.85	5.30	5.70	6.09	6.44	6.78
9.0	2.42	3.28	3.95	4.52	5.03	5.49	5.91	6.31	6.68	7.03
9.5	2.51	3.40	4.09	4.68	5.20	5.68	6.11	6.52	6.91	7.27
10	2.60	3.52	4.23	4.83	5.37	5.86	6.31	6.73	7.13	7.50
11	2.78	3.74	4.49	5.14	5.70	6.21	6.69	7.14	7.56	7.96
12	2.95	3.96	4.75	5.43	6.02	6.56	7.06	7.53	7.97	8.39
13	3.11	4.17	4.99	5.71	6.32	6.90	7.41	7.91	8.36	8.80
14	3.27	4.37	5.23	5.97	6.62	7.22	7.76	8.27	8.75	9.20
15	3.43	4.56	5.46	6.22	6.90	7.52	8.09	8.62	9.12	9.60

Table 7.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .020—Continued.

r = area / wet per.	s = .00055 √s = [illegible]	s = .00060 √s = [illegible]	s = .00065 √s = [illegible]	s = .00070 √s = [illegible]	s = .00075 √s = [illegible]	s = .00080 √s = [illegible]	s = .00085 √s = [illegible]	s = .00090 √s = [illegible]	s = .00095 √s = [illegible]	s = .00100 √s = [illegible]
0.2	.47	.49	.51	.53	.55	.57	.59	.61	.62	.64
0.4	.82	.86	.90	.93	.97	1.00	1.03	1.06	1.09	1.12
0.6	1.13	1.18	1.23	1.28	1.33	1.37	1.41	1.46	1.50	1.54
0.8	1.41	1.47	1.53	1.60	1.65	1.71	1.76	1.82	1.87	1.92
1.0	1.66	1.74	1.81	1.88	1.95	2.02	2.08	2.14	2.20	2.26
1.2	1.90	1.99	2.07	2.15	2.23	2.31	2.38	2.45	2.52	2.58
1.4	2.13	2.23	2.32	2.41	2.49	2.58	2.66	2.74	2.81	2.88
1.6	2.34	2.45	2.55	2.65	2.74	2.83	2.92	3.01	3.09	3.17
1.8	2.55	2.66	2.77	2.88	2.98	3.08	3.17	3.27	3.36	3.45
2.0	2.74	2.86	2.98	3.10	3.21	3.31	3.42	3.52	3.61	3.71
2.2	2.93	3.06	3.19	3.31	3.43	3.54	3.65	3.76	3.86	3.96
2.4	3.11	3.25	3.38	3.51	3.64	3.76	3.87	3.99	4.10	4.20
2.6	3.29	3.43	3.57	3.71	3.84	3.97	4.09	4.21	4.33	4.44
2.8	3.46	3.61	3.76	3.90	4.04	4.17	4.30	4.43	4.55	4.67
3.0	3.62	3.78	3.94	4.09	4.23	4.37	4.50	4.64	4.76	4.89
3.2	3.78	3.95	4.11	4.27	4.42	4.56	4.70	4.84	4.97	5.10
3.4	3.94	4.11	4.28	4.44	4.60	4.75	4.90	5.04	5.18	5.31
3.6	4.09	4.27	4.45	4.62	4.78	4.93	5.09	5.23	5.38	5.52
3.8	4.24	4.43	4.61	4.78	4.95	5.11	5.27	5.42	5.57	5.72
4.0	4.39	4.58	4.77	4.95	5.12	5.29	5.45	5.61	5.76	5.91
4.2	4.53	4.73	4.92	5.11	5.29	5.46	5.63	5.79	5.95	6.10
4.4	4.67	4.88	5.08	5.27	5.45	5.63	5.80	5.97	6.13	6.29
4.6	4.81	5.02	5.23	5.42	5.61	5.79	5.97	6.14	6.31	6.47
4.8	4.94	5.16	5.37	5.57	5.77	5.96	6.14	6.31	6.49	6.65
5.0	5.08	5.30	5.52	5.72	5.92	6.12	6.30	6.48	6.66	6.83
5.2	5.21	5.44	5.66	5.87	6.07	6.27	6.46	6.65	6.83	7.00
5.4	5.34	5.57	5.80	6.01	6.22	6.42	6.62	6.81	6.99	7.18
5.6	5.46	5.70	5.93	6.15	6.37	6.57	6.77	6.97	7.16	7.34
5.8	5.59	5.83	6.07	6.29	6.51	6.72	6.93	7.13	7.32	7.51
6.0	5.71	5.95	6.20	6.43	6.65	6.87	7.08	7.28	7.48	7.67
6.2	5.83	6.08	6.33	6.57	6.79	7.01	7.23	7.43	7.64	7.83
6.4	5.95	6.21	6.46	6.70	6.93	7.16	7.37	7.58	7.79	7.99
6.6	6.07	6.33	6.58	6.83	7.07	7.30	7.52	7.73	7.94	8.15
6.8	6.18	6.45	6.71	6.96	7.20	7.43	7.66	7.88	8.09	8.30
7.0	6.29	6.57	6.83	7.10	7.33	7.57	7.80	8.02	8.24	8.45
7.5	6.57	6.86	7.14	7.41	7.66	7.91	8.14	8.38	8.61	8.83
8.0	6.84	7.14	7.43	7.71	7.97	8.23	8.48	8.72	8.96	9.19
8.5	7.11	7.42	7.71	8.00	8.28	8.54	8.80	9.05	9.30	9.54
9.0	7.36	7.68	7.99	8.29	8.57	8.85	9.12	9.38	9.63	9.87
9.5	7.61	7.94	8.26	8.57	8.86	9.15	9.43	9.69	9.96	10.2
10	7.86	8.20	8.53	8.84	9.15	9.44	9.75	10.0	10.3	10.5
11	8.33	8.69	9.04	9.37	9.69	......	......	......	......	......
12	8.78	9.15	9.53	9.88	10.2	......	......	......	......	......
13	9.22	9.59	10.0	10.4	10.7	......	......	......	......	......
14	9.64	10.0	10.5	10.8	11.2	......	......	......	......	......
15	10.0	10.5	10.9	11.3	11.7	......	......	......	......	......

Table 7.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .020—Continued.

r = hyd. rad. in ft.	s = .00125	s = .0015	s = .00175	s = .002	s = .0025	s = .003	s = .0035	s = .004	s = .005	s = .006
0.2	.72	.79	.85	.91	1.15	1.30	1.46	1.60	1.84	2.06
0.4	1.26	1.38	1.50	1.60	1.97	2.27	2.54	2.79	3.22	3.60
0.6	1.73	1.89	2.05	2.19	2.69	3.11	3.48	3.81	4.41	4.93
0.8	2.15	2.35	2.55	2.72	3.34	3.86	4.32	4.74	5.47	6.12
1.0	2.53	2.77	3.00	3.21	3.94	4.55	5.09	5.58	6.45	7.21
1.2	2.89	3.17	3.43	3.67	4.50	5.19	5.81	6.37	7.35	8.22
1.4	3.23	3.54	3.83	4.09	5.02	5.80	6.48	7.10	8.20	9.18
1.6	3.55	3.89	4.21	4.50	5.51	6.37	7.12	7.80	9.01	10.1
1.8	3.86	4.23	4.57	4.88	5.99	6.91	7.73	8.47	9.78	10.9
2.0	4.15	4.55	4.91	5.26	6.44	7.44	8.31	9.11	10.5	11.8
2.2	4.43	4.85	5.24	5.61	6.87	7.94	8.87	9.72	11.2	12.6
2.4	4.70	5.15	5.57	5.95	7.29	8.42	9.41	10.3	11.9	13.3
2.6	4.96	5.44	5.87	6.28	7.70	8.89	9.94	10.9	12.6	14.0
2.8	5.22	5.72	6.17	6.60	8.09	9.35	10.4	11.4	13.2	14.8
3.0	5.46	5.99	6.47	6.91	8.47	9.78	10.9	12.0	13.8	15.5
3.2	5.70	6.25	6.75	7.22	8.84	10.2	11.4	12.5	14.4	16.1
3.4	5.94	6.50	7.03	7.51	9.20	10.6	11.9	13.0	15.0	16.8
3.6	6.17	6.75	7.29	7.80	9.56	11.0	12.3	13.5	15.6	17.4
3.8	6.39	7.00	7.56	8.08	9.89	11.4	12.8	14.0	16.2	18.1
4.0	6.61	7.24	7.82	8.36	10.2	11.8	13.2	14.5	16.7	18.7
4.2	6.82	7.47	8.07	8.62	10.6	12.2	13.6	14.9	17.2	19.3
4.4	7.03	7.70	8.31	8.89	10.9	12.6	14.1	15.4	17.8	19.8
4.6	7.23	7.92	8.56	9.14	11.2	12.9	14.5	15.8	18.3	20.4
4.8	7.44	8.14	8.79	9.40	11.5	13.3	14.9	16.3	18.8	21.0
5.0	7.63	8.36	9.02	9.65	11.8	13.6	15.3	16.7	19.3	21.5
5.2	7.83	8.57	9.25	9.89	12.1	14.0	15.6	17.1	19.8	22.1
5.4	8.02	8.78	9.48	10.1	12.4	14.3	16.0	17.5	20.2	22.6
5.6	8.21	8.98	9.70	10.4	12.7	14.7	16.4	17.9	20.7	23.2
5.8	8.39	9.19	9.92	10.6	13.0	15.0	16.7	18.3	21.2	23.7
6.0	8.57	9.38	10.1	10.8	13.3	15.3	17.1	18.7	21.6	24.2
6.2	8.75	9.58	10.3	11.1	13.5	15.6	17.5	19.1	22.1	24.7
6.4	8.93	9.77	10.5	11.3	13.8	15.9	17.8	19.5	22.5	25.2
6.6	9.10	9.96	10.8	11.5	14.1	16.2	18.2	19.9	23.0	25.7
6.8	9.27	10.2	11.0	11.7	14.3	16.5	18.5	20.2	23.4	26.1
7.0	9.44	10.4	11.2	11.9	14.6	16.8	18.8	20.6	23.8	26.6
7.2	9.60	10.6	11.4	12.2	14.8	17.1	19.1	20.9	24.2	27.0
7.4	9.76	10.8	11.7	12.5	15.2	17.5	19.7	21.5	24.8	27.8
7.6	10.3	11.2	12.1	13.0	15.9	18.3	20.5	22.4	25.9	28.9
7.8	10.7	11.7	12.6	13.5	16.5	19.0	21.3	23.2	26.8	29.9
8.0	11.0	12.1	13.0	14.0	17.0	19.7	22.0	24.1	27.8	31.1
8.5	11.4	12.5	13.5	14.4	17.6	20.3	22.7	24.9	28.7	32.1
10.0	11.8	12.9	13.9	14.9	18.2	21.0	23.4	25.7	29.6	33.1

Table 8.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .0225.

$r=\frac{\text{area}}{\text{wet per.}}$	f=.264 s=.00005	f=.528 s=.00010	f=.792 s=.00015	f=1.056 s=.00020	f=1.320 s=.00025	f=1.584 s=.00030	f=1.848 s=.00035	f=2.112 s=.00040	f=2.376 s=.00045	f=2.640 s=.00050	f=2.904 s=.00055
0.2	.10	.15	.19	.23	.26	.29	.31	.34	.36	.38	.40
0.4	.18	.27	.35	.41	.46	.51	.56	.60	.64	.67	.71
0.6	.25	.39	.49	.57	.64	.71	.77	.83	.88	.93	.98
0.8	.33	.49	.61	.72	.81	.89	.97	1.04	1.10	1.17	1.23
1.0	.39	.59	.73	.86	.96	1.06	1.15	1.23	1.31	1.39	1.45
1.2	.46	.68	.84	.98	1.11	1.22	1.32	1.42	1.50	1.59	1.67
1.4	.52	.76	.95	1.10	1.24	1.37	1.48	1.59	1.69	1.78	1.87
1.6	.58	.85	1.05	1.22	1.38	1.51	1.64	1.75	1.86	1.96	2.06
1.8	.64	.93	1.15	1.34	1.50	1.65	1.78	1.91	2.03	2.14	2.24
2.0	.70	1.01	1.25	1.44	1.62	1.78	1.92	2.06	2.19	2.31	2.42
2.2	.75	1.08	1.34	1.55	1.74	1.91	2.06	2.20	2.34	2.47	2.59
2.4	.81	1.16	1.43	1.65	1.85	2.03	2.19	2.35	2.49	2.62	2.75
2.6	.86	1.23	1.51	1.75	1.96	2.15	2.32	2.48	2.63	2.78	2.91
2.8	.91	1.30	1.59	1.84	2.06	2.26	2.44	2.61	2.77	2.92	3.07
3.0	.96	1.37	1.68	1.94	2.17	2.37	2.56	2.74	2.91	3.07	3.22
3.2	1.01	1.43	1.75	2.03	2.27	2.48	2.68	2.87	3.04	3.21	3.36
3.4	1.06	1.50	1.83	2.12	2.37	2.59	2.80	2.99	3.17	3.34	3.50
3.6	1.11	1.56	1.91	2.20	2.46	2.69	2.91	3.11	3.30	3.47	3.64
3.8	1.16	1.62	1.98	2.29	2.55	2.79	3.02	3.23	3.42	3.60	3.78
4.0	1.20	1.68	2.06	2.37	2.64	2.89	3.12	3.34	3.54	3.73	3.91
4.2	1.25	1.74	2.13	2.45	2.73	2.99	3.23	3.45	3.66	3.85	4.04
4.4	1.29	1.80	2.20	2.53	2.82	3.09	3.33	3.56	3.78	3.98	4.17
4.6	1.34	1.86	2.27	2.61	2.91	3.18	3.43	3.67	3.89	4.10	4.29
4.8	1.38	1.92	2.33	2.69	2.99	3.28	3.53	3.77	4.00	4.21	4.42
5.0	1.42	1.97	2.40	2.76	3.08	3.37	3.63	3.88	4.11	4.33	4.54
5.2	1.46	2.03	2.47	2.83	3.16	3.46	3.73	3.98	4.22	4.44	4.66
5.4	1.51	2.09	2.53	2.91	3.24	3.54	3.82	4.08	4.32	4.55	4.77
5.6	1.55	2.14	2.59	2.98	3.32	3.63	3.91	4.18	4.43	4.66	4.89
5.8	1.59	2.19	2.66	3.05	3.40	3.72	4.01	4.28	4.53	4.77	5.00
6.0	1.63	2.24	2.72	3.12	3.48	3.80	4.10	4.37	4.63	4.88	5.11
6.2	1.67	2.30	2.78	3.19	3.55	3.88	4.19	4.47	4.73	4.98	5.22
6.4	1.71	2.35	2.84	3.26	3.63	3.96	4.27	4.56	4.83	5.09	5.33
6.6	1.75	2.40	2.90	3.33	3.70	4.04	4.36	4.65	4.93	5.19	5.44
6.8	1.78	2.45	2.96	3.39	3.78	4.12	4.45	4.74	5.02	5.29	5.55
7.0	1.82	2.50	3.02	3.46	3.85	4.20	4.53	4.83	5.12	5.39	5.65
7.5	1.91	2.62	3.16	3.62	4.03	4.39	4.74	5.05	5.35	5.63	5.90
8.0	2.01	2.73	3.30	3.78	4.20	4.58	4.94	5.27	5.58	5.87	6.15
8.5	2.10	2.85	3.43	3.93	4.37	4.76	5.13	5.48	5.80	6.10	6.39
9.0	2.18	2.96	3.56	4.08	4.53	4.94	5.32	5.68	6.01	6.33	6.63
9.5	2.27	3.07	3.69	4.22	4.69	5.11	5.51	5.87	6.22	6.55	6.86
10	2.35	3.18	3.82	4.36	4.85	5.28	5.69	6.07	6.42	6.76	7.08
11	2.51	3.38	4.06	4.64	5.15	5.61	6.04	6.44	6.82	7.17	7.51
12	2.67	3.58	4.29	4.90	5.44	5.93	6.38	6.80	7.20	7.57	7.93
13	2.82	3.77	4.52	5.15	5.72	6.23	6.70	7.14	7.56	7.95	8.33
14	2.97	3.96	4.74	5.40	5.99	6.52	7.02	7.48	7.91	8.32	8.71
15	3.11	4.14	4.95	5.64	6.25	6.80	7.32	7.80	8.25	8.68	9.09

Table 8.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*
n=.0225—Continued.

area / wet per.	F=3.163 S=.00060	F=3.422 S=.00065	F=3.696 S=.00070	F=3.980 S=.00075	F=4.324 S=.00080	F=4.488 S=.00085	F=4.752 S=.00090	F=5.016 S=.00095	F=5.280 S=.00100	F=6.60 S=.00125
0.2	.42	.44	.45	.47	.49	.50	.52	.53	.55	.61
0.4	.74	.77	.80	.83	.86	.89	.92	.94	.97	1.09
0.6	1.03	1.07	1.11	1.15	1.19	1.23	1.27	1.30	1.34	1.50
0.8	1.29	1.34	1.39	1.44	1.49	1.54	1.58	1.63	1.67	1.87
1.0	1.52	1.59	1.65	1.71	1.76	1.82	1.87	1.93	1.98	2.21
1.2	1.74	1.82	1.89	1.96	2.02	2.08	2.15	2.21	2.26	2.53
1.4	1.95	2.04	2.11	2.19	2.26	2.33	2.40	2.47	2.53	2.84
1.6	2.15	2.24	2.33	2.41	2.49	2.57	2.65	2.72	2.79	3.12
1.8	2.35	2.44	2.54	2.63	2.71	2.80	2.88	2.96	3.04	3.40
2.0	2.53	2.63	2.73	2.83	2.93	3.02	3.10	3.19	3.27	3.66
2.2	2.71	2.82	2.93	3.03	3.13	3.23	3.32	3.41	3.50	3.92
2.4	2.88	3.00	3.11	3.22	3.33	3.43	3.53	3.63	3.72	4.16
2.6	3.04	3.17	3.29	3.40	3.52	3.62	3.73	3.83	3.93	4.40
2.8	3.20	3.34	3.46	3.58	3.70	3.81	3.93	4.03	4.14	4.63
3.0	3.36	3.50	3.63	3.76	3.88	4.00	4.12	4.23	4.34	4.85
3.2	3.51	3.66	3.79	3.93	4.06	4.18	4.30	4.42	4.53	5.07
3.4	3.66	3.81	3.95	4.09	4.23	4.36	4.48	4.60	4.72	5.28
3.6	3.80	3.96	4.11	4.25	4.39	4.53	4.66	4.79	4.91	5.49
3.8	3.94	4.11	4.26	4.41	4.55	4.70	4.83	4.96	5.09	5.69
4.0	4.08	4.25	4.41	4.56	4.71	4.86	5.00	5.14	5.27	5.8
4.2	4.22	4.39	4.56	4.72	4.87	5.02	5.16	5.30	5.44	6.08
4.4	4.35	4.53	4.70	4.86	5.02	5.18	5.32	5.47	5.61	6.27
4.6	4.48	4.67	4.84	5.01	5.17	5.33	5.48	5.63	5.78	6.46
4.8	4.61	4.80	4.98	5.15	5.32	5.48	5.64	5.79	5.94	6.64
5.0	4.74	4.93	5.11	5.29	5.46	5.63	5.79	5.95	6.10	6.82
5.2	4.86	5.06	5.25	5.43	5.61	5.78	5.94	6.11	6.26	7.00
5.4	4.98	5.19	5.38	5.57	5.75	5.92	6.09	6.26	6.42	7.17
5.6	5.10	5.31	5.51	5.70	5.88	6.06	6.24	6.41	6.57	7.34
5.8	5.22	5.43	5.63	5.83	6.02	6.20	6.38	6.56	6.72	7.51
6.0	5.34	5.55	5.76	5.96	6.15	6.34	6.52	6.70	6.87	7.68
6.2	5.45	5.67	5.88	6.09	6.28	6.48	6.66	6.84	7.02	7.84
6.4	5.57	5.79	6.00	6.21	6.41	6.61	6.80	6.98	7.16	8.00
6.6	5.68	5.91	6.12	6.34	6.54	6.74	6.93	7.12	7.31	8.16
6.8	5.79	6.02	6.24	6.46	6.67	6.87	7.07	7.26	7.45	8.32
7.0	5.90	6.13	6.36	6.58	6.79	7.00	7.20	7.40	7.59	8.47
7.5	6.16	6.41	6.65	6.88	7.10	7.31	7.52	7.73	7.93	8.85
8.0	6.42	6.68	6.92	7.16	7.40	7.62	7.84	8.05	8.26	9.22
8.5	6.67	6.94	7.19	7.44	7.68	7.92	8.14	8.36	8.58	9.58
9.0	6.92	7.19	7.46	7.72	7.96	8.21	8.44	8.67	8.89	9.92
9.5	7.15	7.44	7.71	7.98	8.24	8.49	8.73	8.97	9.19	10.3
10	7.39	7.68	7.97	8.24	8.50	8.76	9.01	9.26	9.49	10.6
11	7.84	8.15	8.45	8.74	.....	.....	.....	.....	.....	.....
12	8.27	8.60	8.92	9.22	.....	.....	.....	.....	.....	.....
13	8.69	9.03	9.36	9.68	.....	.....	.....	.....	.....	.....
14	9.09	9.45	9.80	10.1	.....	.....	.....	.....	.....	.....
15	9.48	9.85	10.2	10.6	.....	.....	.....	.....	.....	.....

Table 8.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness* n = .0225—Continued.

Fall per 100 ft.	R = 7.87 S = .00150	R = 9.34 S = .00175	R = 10.66 S = .002	R = 15.84 S = .003	R = 21.13 S = .004	R = 26.40 S = .005	R = 31.68 S = .006	R = 42.24 S = .008	R = 52.80 S = .010
0.2	.67	.73	.78	.96	1.11	1.24	1.36	1.58	1.76
0.4	1.19	1.29	1.38	1.70	1.96	2.19	2.41	2.78	3.11
0.6	1.64	1.78	1.90	2.34	2.70	3.02	3.31	3.82	4.28
0.8	2.05	2.22	2.37	2.91	3.37	3.77	4.13	4.77	5.33
1.0	2.43	2.62	2.81	3.44	3.98	4.45	4.88	5.63	6.30
1.2	2.78	3.00	3.21	3.94	4.55	5.09	5.58	6.44	7.21
1.4	3.11	3.36	3.60	4.41	5.09	5.70	6.24	7.21	8.06
1.6	3.43	3.70	3.96	4.85	5.61	6.27	6.87	7.93	8.87
1.8	3.73	4.03	4.31	5.28	6.10	6.83	7.47	8.63	9.64
2.0	4.01	4.34	4.64	5.68	6.57	7.34	8.04	9.29	10.4
2.2	4.29	4.64	4.96	6.08	7.02	7.85	8.60	9.93	11.1
2.4	4.56	4.93	5.27	6.45	7.45	8.33	9.13	10.5	11.8
2.6	4.82	5.21	5.57	6.82	7.83	8.84	9.65	11.1	12.4
2.8	5.07	5.48	5.86	7.17	8.28	9.26	10.2	11.7	13.1
3.0	5.32	5.74	6.14	7.52	8.68	9.71	10.6	12.3	13.7
3.2	5.55	6.00	6.41	7.86	9.07	10.1	11.1	12.8	14.3
3.4	5.78	6.25	6.68	8.18	9.44	10.6	11.6	13.4	14.9
3.6	6.01	6.49	6.94	8.50	9.81	11.0	12.0	13.9	15.5
3.8	6.23	6.73	7.20	8.81	10.2	11.4	12.5	14.4	16.1
4.0	6.45	6.96	7.44	9.12	10.5	11.8	12.9	14.9	16.6
4.2	6.66	7.19	7.69	9.41	10.9	12.2	13.3	15.4	17.2
4.4	6.87	7.42	7.93	9.71	11.2	12.6	13.7	15.9	17.7
4.6	7.07	7.64	8.16	9.99	11.5	12.9	14.1	16.3	18.2
4.8	7.27	7.85	8.39	10.3	11.9	13.3	14.5	16.8	18.8
5.0	7.47	8.07	8.62	10.6	12.2	13.6	14.9	17.2	19.2
5.2	7.66	8.27	8.84	10.8	12.5	14.0	15.2	17.7	19.8
5.4	7.85	8.48	9.06	11.1	12.8	14.3	15.7	18.1	20.2
5.6	8.04	8.68	9.28	11.4	13.1	14.7	16.1	18.5	20.7
5.8	8.22	8.88	9.49	11.6	13.4	15.0	16.4	19.0	21.2
6.0	8.40	9.07	9.70	11.9	13.7	15.3	16.8	19.4	21.6
6.2	8.58	9.27	9.90	12.1	14.0	15.6	17.1	19.8	22.1
6.4	8.76	9.46	10.1	12.4	14.3	16.0	17.5	20.2	22.6
6.6	8.93	9.65	10.3	12.6	14.6	16.3	17.8	20.6	23.0
6.8	9.11	9.82	10.5	12.9	14.8	16.6	18.2	21.0	23.4
7.0	9.27	9.99	10.7	13.1	15.1	16.9	18.5	21.4	23.9
7.5	9.68	10.5	11.2	13.7	15.8	17.7	19.3	22.3	24.9
8.0	10.1	10.9	11.6	14.3	16.4	18.4	20.1	23.2	26.0
8.5	10.5	11.3	12.1	14.8	17.1	19.1	20.9	24.1	27.0
9.0	10.9	11.7	12.5	15.3	17.7	19.8	21.7	25.0	27.9
9.5	11.3	12.1	13.0	15.9	18.3	20.5	22.4	25.9	28.9
10.0	11.6	12.5	13.4	16.4	18.9	21.1	23.1	26.7	29.8

Table 9.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

$n = .025$.

Grade $= \frac{\text{rise}}{\text{feet run}}$	$R = .254$ $S = .00005$	$R = .578$ $S = .00010$	$R = .792$ $S = .00015$	$R = 1.036$ $S = .00020$	$R = 1.220$ $S = .00025$	$R = 1.354$ $S = .00030$	$R = 1.565$ $S = .00035$	$R = 2.172$ $S = .00040$	$R = 2.576$ $S = .00045$	$R = 2.946$ $S = .00050$
0.2	.08	.13	.17	.20	.22	.25	.27	.29	.31	.33
0.4	.16	.24	.30	.36	.41	.45	.49	.53	.56	.59
0.6	.23	.34	.43	.50	.57	.63	.68	.73	.78	.82
0.8	.29	.43	.54	.63	.72	.79	.86	.92	.98	1.03
1.0	.35	.52	.65	.76	.85	.94	1.02	1.09	1.16	1.23
1.2	.41	.60	.75	.87	.98	1.08	1.17	1.26	1.34	1.41
1.4	.47	.68	.84	.99	1.11	1.22	1.32	1.41	1.51	1.59
1.6	.52	.76	.94	1.09	1.23	1.35	1.46	1.56	1.66	1.76
1.8	.57	.83	1.03	1.19	1.34	1.47	1.59	1.70	1.81	1.91
2.0	.62	.90	1.11	1.29	1.45	1.59	1.72	1.84	1.96	2.06
2.2	.67	.97	1.20	1.39	1.55	1.71	1.84	1.97	2.10	2.21
2.4	.72	1.04	1.28	1.48	1.66	1.82	1.96	2.10	2.23	2.35
2.6	.77	1.10	1.36	1.57	1.76	1.93	2.08	2.23	2.36	2.49
2.8	.82	1.17	1.43	1.66	1.85	2.03	2.19	2.35	2.49	2.63
3.0	.86	1.23	1.51	1.74	1.95	2.13	2.31	2.46	2.61	2.76
3.2	.91	1.29	1.58	1.82	2.04	2.23	2.41	2.58	2.74	2.88
3.4	.96	1.35	1.65	1.90	2.13	2.33	2.52	2.69	2.85	3.01
3.6	1.00	1.41	1.72	1.98	2.22	2.43	2.62	2.80	2.97	3.13
3.8	1.04	1.46	1.79	2.06	2.30	2.52	2.72	2.91	3.08	3.25
4.0	1.08	1.52	1.85	2.14	2.39	2.61	2.82	3.01	3.19	3.37
4.2	1.13	1.57	1.92	2.21	2.47	2.70	2.92	3.12	3.30	3.48
4.4	1.17	1.63	1.99	2.29	2.55	2.79	3.01	3.22	3.41	3.59
4.6	1.21	1.68	2.05	2.36	2.63	2.88	3.10	3.32	3.51	3.70
4.8	1.25	1.74	2.11	2.43	2.71	2.96	3.19	3.41	3.62	3.81
5.0	1.29	1.79	2.17	2.50	2.78	3.04	3.28	3.51	3.72	3.93
5.2	1.33	1.84	2.23	2.57	2.86	3.13	3.37	3.60	3.82	4.02
5.4	1.36	1.89	2.29	2.63	2.93	3.21	3.45	3.69	3.92	4.12
5.6	1.40	1.94	2.35	2.70	3.01	3.29	3.55	3.79	4.01	4.22
5.8	1.44	1.99	2.41	2.77	3.08	3.37	3.63	3.88	4.11	4.32
6.0	1.48	2.03	2.47	2.83	3.15	3.44	3.71	3.95	4.20	4.42
6.2	1.51	2.08	2.52	2.89	3.22	3.52	3.80	4.05	4.29	4.52
6.4	1.55	2.13	2.58	2.96	3.29	3.60	3.88	4.14	4.38	4.62
6.6	1.59	2.18	2.63	3.02	3.36	3.67	3.96	4.22	4.47	4.71
6.8	1.62	2.22	2.69	3.08	3.43	3.74	4.04	4.31	4.56	4.80
7.0	1.65	2.27	2.74	3.14	3.50	3.81	4.11	4.39	4.65	4.89
7.5	1.74	2.38	2.87	3.29	3.66	3.99	4.30	4.59	4.86	5.12
8.0	1.83	2.49	3.00	3.43	3.82	4.17	4.49	4.79	5.07	5.34
8.5	1.91	2.59	3.13	3.57	3.98	4.34	4.67	4.98	5.27	5.55
9.0	1.99	2.70	3.25	3.71	4.13	4.50	4.85	5.18	5.47	5.76
9.5	2.07	2.80	3.37	3.85	4.28	4.66	5.02	5.35	5.67	5.96
10	2.15	2.90	3.48	3.98	4.42	4.82	5.19	5.53	5.86	6.16
11	2.30	3.09	3.71	4.23	4.70	5.12	5.51	5.88	6.22	6.55
12	2.44	3.28	3.92	4.48	4.97	5.41	5.82	6.21	6.57	6.91
13	2.58	3.45	4.13	4.71	5.23	5.70	6.13	6.53	6.91	7.27
14	2.72	3.63	4.34	4.94	5.48	5.97	6.42	6.84	7.24	7.61
15	2.85	3.80	4.53	5.16	5.72	6.23	6.70	7.14	7.55	7.94
16	2.99	3.96	4.72	5.37	5.96	6.48	6.97	7.43	7.86	8.26

Table 9.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*
n = .025—Continued.

area ÷ wet perimeter = r	S = .00005	S = .00010	S = .00015	S = .00020	S = .00025	S = .00030	S = .00035	S = .00040	S = .00045	S = .00050
0.2	.35	.36	.38	.39	.41	.42	.44	.45	.46	.48
0.4	.62	.65	.68	.71	.73	.76	.78	.80	.83	.85
0.6	.86	.90	.94	.98	1.01	1.05	1.08	1.11	1.15	1.18
0.8	1.08	1.13	1.18	1.23	1.27	1.32	1.36	1.40	1.44	1.48
1.0	1.29	1.35	1.40	1.46	1.51	1.57	1.61	1.66	1.71	1.76
1.2	1.48	1.55	1.61	1.68	1.74	1.80	1.85	1.91	1.96	2.01
1.4	1.66	1.74	1.81	1.88	1.95	2.01	2.07	2.14	2.20	2.26
1.6	1.84	1.92	2.00	2.08	2.15	2.22	2.29	2.36	2.43	2.49
1.8	2.00	2.10	2.18	2.27	2.34	2.42	2.50	2.57	2.64	2.71
2.0	2.17	2.26	2.36	2.45	2.53	2.62	2.70	2.78	2.85	2.93
2.2	2.32	2.42	2.52	2.62	2.71	2.80	2.89	2.97	3.06	3.14
2.4	2.47	2.58	2.68	2.79	2.88	2.98	3.07	3.16	3.25	3.34
2.6	2.61	2.73	2.84	2.95	3.05	3.16	3.25	3.35	3.44	3.53
2.8	2.75	2.88	3.00	3.11	3.22	3.33	3.43	3.53	3.62	3.72
3.0	2.89	3.02	3.14	3.26	3.38	3.49	3.60	3.70	3.80	3.90
3.2	3.02	3.16	3.29	3.41	3.53	3.65	3.76	3.87	3.98	4.08
3.4	3.15	3.30	3.43	3.56	3.68	3.80	3.92	4.04	4.15	4.22
3.6	3.28	3.43	3.57	3.70	3.83	3.96	4.08	4.20	4.31	4.45
3.8	3.41	3.56	3.70	3.84	3.98	4.11	4.23	4.35	4.47	4.59
4.0	3.53	3.68	3.83	3.98	4.12	4.25	4.38	4.51	4.63	4.75
4.2	3.65	3.81	3.96	4.11	4.26	4.40	4.53	4.66	4.79	4.91
4.4	3.77	3.93	4.09	4.24	4.39	4.54	4.67	4.81	4.94	5.07
4.6	3.88	4.05	4.22	4.37	4.53	4.67	4.82	4.96	5.09	5.22
4.8	3.99	4.17	4.34	4.50	4.66	4.81	4.96	5.10	5.24	5.37
5.0	4.11	4.28	4.46	4.63	4.79	4.94	5.09	5.24	5.38	5.52
5.2	4.21	4.40	4.58	4.75	4.91	5.07	5.23	5.38	5.53	5.67
5.4	4.32	4.51	4.69	4.87	5.04	5.20	5.36	5.52	5.67	5.81
5.6	4.43	4.62	4.81	4.99	5.16	5.33	5.49	5.65	5.80	5.95
5.8	4.53	4.73	4.92	5.11	5.28	5.46	5.62	5.78	5.94	6.09
6.0	4.64	4.84	5.03	5.22	5.40	5.58	5.75	5.91	6.07	6.22
6.2	4.74	4.94	5.14	5.34	5.52	5.70	5.87	6.04	6.20	6.36
6.4	4.84	5.05	5.25	5.45	5.64	5.82	6.00	6.17	6.33	6.50
6.6	4.94	5.15	5.36	5.56	5.75	5.94	6.12	6.29	6.46	6.63
6.8	5.03	5.25	5.46	5.67	5.86	6.05	6.24	6.42	6.59	6.76
7.0	5.13	5.35	5.57	5.77	5.97	6.17	6.36	6.54	6.71	6.89
7.5	5.36	5.60	5.82	6.04	6.25	6.45	6.65	6.84	7.02	7.20
8.0	5.59	5.84	6.07	6.30	6.51	6.72	6.93	7.13	7.32	7.51
8.5	5.82	6.07	6.31	6.54	6.77	6.99	7.20	7.41	7.61	7.80
9.0	6.03	6.30	6.55	6.79	7.02	7.25	7.47	7.68	7.89	8.09
9.5	6.25	6.52	6.78	7.03	7.27	7.50	7.73	7.95	8.16	8.37
10	6.45	6.73	7.00	7.26	7.51	7.75	7.98	8.21	8.43	8.65
11	6.85	7.15	7.44	7.71	7.97	.....	.....	.....	.....	.....
12	7.24	7.55	7.85	8.14	8.42	.....	.....	.....	.....	.....
13	7.61	7.94	8.25	8.56	8.85	.....	.....	.....	.....	.....
14	7.97	8.31	8.64	8.96	9.26	.....	.....	.....	.....	.....
15	8.32	8.67	9.02	9.35	9.66	.....	.....	.....	.....	.....
16	8.65	9.02	9.38	9.72	10.1	.....	.....	.....	.....	.....

Table 9.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .025—Continued.

$r = \frac{\text{area}}{\text{wet per.}}$	F=6.60 S=.00125	F=7.22 S=.00150	F=8.24 S=.00175	F=10.56 S=.002	F=15.84 S=.003	F=21.12 S=.004	F=26.40 S=.005	F=31.68 S=.006	F=42.24 S=.008	F=52.80 S=.010
0.2	.53	.59	.63	.68	.83	.97	1.08	1.18	1.37	1.53
0.4	.95	1.04	1.13	1.21	1.49	1.72	1.92	2.11	2.43	2.72
0.6	1.32	1.44	1.57	1.68	2.06	2.38	2.66	2.92	3.37	3.77
0.8	1.65	1.81	1.96	2.10	2.57	2.97	3.33	3.65	4.21	4.72
1.0	1.96	2.15	2.33	2.49	3.05	3.53	3.95	4.32	4.99	5.59
1.2	2.25	2.47	2.67	2.85	3.50	4.05	4.53	4.96	5.73	6.40
1.4	2.53	2.77	2.99	3.20	3.92	4.54	5.07	5.56	6.42	7.17
1.6	2.79	3.05	3.30	3.53	4.33	5.00	5.59	6.13	7.08	7.91
1.8	3.04	3.33	3.60	3.85	4.71	5.45	6.09	6.67	7.71	8.62
2.0	3.28	3.59	3.88	4.15	5.08	5.87	6.57	7.19	8.31	9.29
2.2	3.51	3.84	4.15	4.44	5.44	6.28	7.03	7.70	8.89	9.94
2.4	3.73	4.09	4.42	4.72	5.79	6.68	7.47	8.19	9.45	10.6
2.6	3.95	4.32	4.67	5.00	6.12	7.07	7.90	8.66	10.0	11.2
2.8	4.16	4.55	4.92	5.26	6.44	7.44	8.32	9.11	10.5	11.8
3.0	4.36	4.78	5.16	5.51	6.76	7.80	8.73	9.56	11.0	12.3
3.2	4.56	5.00	5.40	5.77	7.07	8.16	9.12	9.99	11.5	12.9
3.4	4.76	5.21	5.63	6.01	7.37	8.50	9.51	10.4	12.0	13.4
3.6	4.94	5.42	5.85	6.25	7.66	8.84	9.88	10.8	12.5	14.0
3.8	5.13	5.62	6.07	6.49	7.94	9.17	10.3	11.2	13.0	14.5
4.0	5.31	5.82	6.28	6.71	8.22	9.49	10.6	11.6	13.4	15.0
4.2	5.49	6.01	6.50	6.94	8.50	9.81	11.0	12.0	13.9	15.5
4.4	5.66	6.20	6.70	7.16	8.77	10.1	11.3	12.4	14.3	16.0
4.6	5.84	6.39	6.90	7.38	9.03	10.4	11.7	12.8	14.7	16.5
4.8	6.00	6.57	7.10	7.59	9.29	10.7	12.0	13.1	15.2	17.0
5.0	6.17	6.75	7.29	7.80	9.54	11.0	12.3	13.5	15.6	17.4
5.2	6.33	6.93	7.49	8.00	9.79	11.3	12.6	13.8	16.0	17.9
5.4	6.49	7.11	7.68	8.20	10.0	11.6	13.0	14.2	16.4	18.3
5.6	6.65	7.28	7.86	8.40	10.3	11.9	13.3	14.5	16.8	18.8
5.8	6.81	7.45	8.04	8.60	10.5	12.1	13.6	14.9	17.2	19.2
6.0	6.96	7.61	8.22	8.79	10.8	12.4	13.9	15.2	17.6	19.6
6.2	7.11	7.78	8.40	8.98	11.0	12.7	14.2	15.5	17.9	20.0
6.4	7.26	7.94	8.58	9.17	11.2	13.0	14.5	15.9	18.3	20.5
6.6	7.40	8.10	8.75	9.35	11.4	13.2	14.8	16.2	18.7	20.9
6.8	7.55	8.26	8.92	9.53	11.7	13.5	15.1	16.5	19.0	21.2
7.0	7.69	8.42	9.09	9.71	11.9	13.7	15.3	16.8	19.4	21.7
7.5	8.04	8.80	9.50	10.2	12.4	14.3	16.0	17.6	20.3	22.6
8.0	8.38	9.17	9.90	10.6	13.0	14.9	16.7	18.3	21.1	23.6
8.5	8.71	9.53	10.3	11.0	13.5	15.5	17.4	19.0	21.9	24.5
9.0	9.03	9.89	10.7	11.4	14.0	16.1	18.0	19.7	22.7	25.4
9.5	9.35	10.2	11.0	11.8	14.4	16.7	18.6	20.4	23.5	26.3
10.0	9.66	10.5	11.4	12.2	14.9	17.2	19.2	21.1	24.3	27.2

Table 10.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .030.

Area ÷ wet per.	F = .004 S = .000005	F = .126 S = .000010	F = .792 S = .00005	F = 1.008 S = .00020	F = 1.260 S = .00025	F = 1.494 S = .00030	F = 1.848 S = .00035	F = 2.112 S = .00040	F = 2.376 S = .00045	F = 2.640 S = .00050	F = 2.904 S = .00055
0.3	.07	.10	.13	.16	.18	.20	.21	.23	.24	.26	.27
0.4	.13	.19	.24	.29	.32	.36	.39	.42	.44	.47	.49
0.5	.18	.27	.34	.40	.45	.50	.55	.59	.62	.66	.69
0.6	.23	.35	.44	.51	.57	.63	.69	.74	.79	.83	.88
0.7	.28	.42	.53	.61	.69	.76	.83	.89	.94	1.00	1.05
0.8	.33	.49	.61	.71	.80	.88	.96	1.02	1.09	1.15	1.21
0.9	.38	.56	.69	.80	.91	.99	1.08	1.15	1.23	1.30	1.36
1.0	.43	.62	.77	.89	1.01	1.10	1.20	1.28	1.36	1.44	1.51
1.1	.47	.68	.84	.98	1.10	1.21	1.31	1.40	1.49	1.57	1.65
1.2	.51	.74	.92	1.07	1.19	1.31	1.42	1.52	1.61	1.70	1.78
1.3	.56	.80	.99	1.15	1.28	1.41	1.53	1.63	1.73	1.83	1.92
1.4	.60	.86	1.06	1.22	1.37	1.51	1.63	1.74	1.85	1.95	2.04
1.5	.64	.91	1.12	1.30	1.46	1.60	1.73	1.85	1.96	2.07	2.17
1.6	.68	.97	1.19	1.37	1.54	1.69	1.82	1.95	2.07	2.18	2.29
1.7	.72	1.02	1.25	1.45	1.62	1.77	1.92	2.05	2.17	2.29	2.40
1.8	.76	1.07	1.32	1.53	1.70	1.86	2.01	2.15	2.28	2.40	2.52
1.9	.80	1.12	1.38	1.59	1.78	1.95	2.10	2.25	2.38	2.51	2.63
2.0	.83	1.17	1.44	1.66	1.85	2.03	2.19	2.34	2.48	2.61	2.74
2.1	.87	1.22	1.50	1.72	1.92	2.11	2.28	2.43	2.58	2.72	2.85
2.2	.91	1.27	1.55	1.78	2.00	2.18	2.36	2.52	2.67	2.83	2.95
2.3	.94	1.32	1.61	1.85	2.07	2.26	2.44	2.61	2.77	2.92	3.06
2.4	.98	1.37	1.67	1.92	2.14	2.34	2.53	2.70	2.86	3.01	3.16
2.5	1.01	1.41	1.72	1.98	2.21	2.42	2.61	2.78	2.95	3.11	3.26
2.6	1.05	1.46	1.78	2.04	2.28	2.49	2.69	2.87	3.04	3.20	3.36
2.7	1.08	1.50	1.83	2.10	2.34	2.56	2.76	2.95	3.13	3.29	3.45
2.8	1.12	1.55	1.88	2.16	2.41	2.63	2.84	3.03	3.21	3.38	3.55
2.9	1.15	1.59	1.93	2.22	2.47	2.70	2.92	3.11	3.30	3.47	3.64
3.0	1.18	1.63	1.98	2.28	2.54	2.77	2.99	3.19	3.38	3.56	3.73
3.1	1.22	1.68	2.03	2.34	2.60	2.84	3.06	3.27	3.46	3.65	3.82
3.2	1.25	1.72	2.08	2.40	2.66	2.91	3.14	3.35	3.55	3.73	3.91
3.3	1.28	1.76	2.13	2.45	2.72	2.98	3.21	3.42	3.63	3.82	4.00
3.4	1.31	1.80	2.18	2.51	2.78	3.04	3.28	3.50	3.71	3.90	4.09
3.5	1.34	1.84	2.22	2.56	2.84	3.11	3.35	3.57	3.78	3.98	4.17
3.6	1.37	1.88	2.28	2.61	2.90	3.17	3.42	3.65	3.86	4.06	4.26
3.7	1.40	1.92	2.32	2.66	2.96	3.24	3.48	3.72	3.94	4.14	4.34
3.8	1.43	2.02	2.44	2.79	3.11	3.39	3.65	3.90	4.13	4.34	4.55
3.9	1.55	2.12	2.55	2.92	3.25	3.54	3.81	4.07	4.31	4.53	4.75
4.0	1.62	2.21	2.66	3.04	3.38	3.69	3.97	4.24	4.49	4.72	4.95
4.5	1.70	2.30	2.77	3.16	3.51	3.83	4.13	4.40	4.66	4.90	5.14
5.0	1.77	2.39	2.87	3.28	3.64	3.97	4.28	4.56	4.83	5.08	5.32
10	1.84	2.48	2.97	3.40	3.77	4.11	4.43	4.72	4.99	5.25	5.50
11	1.97	2.65	3.17	3.63	4.02	4.38	4.71	5.02	5.31	5.59	5.86
12	2.10	2.81	3.36	3.84	4.25	4.63	4.99	5.31	5.62	5.92	6.19
13	2.23	2.97	3.55	4.04	4.48	4.88	5.25	5.59	5.92	6.23	6.52
14	2.35	3.12	3.73	4.24	4.70	5.12	5.51	5.86	6.21	6.53	6.84
15	2.47	3.27	3.90	4.43	4.92	5.35	5.76	6.13	6.49	6.82	7.14
16	2.58	3.42	4.07	4.62	5.13	5.57	6.00	6.39	6.76	7.11	7.44

Table 10.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .030—Continued.

r = area / wet per.	F=2.128 S=.00020	F=2.423 S=.00025	F=2.683 S=.00030	F=3.009 S=.00075	F=4.772 S=.00050	F=4.288 S=.00075	F=4.753 S=.00100	F=5.016 S=.00125	F=5.289 S=.00150	F=6.49 S=.00125	F=7.92 S=.00150
0.2	.28	.30	.31	.32	.33	.34	.35	.36	.37	.42	.46
0.4	.52	.54	.56	.58	.60	.62	.64	.66	.67	.76	.83
0.6	.72	.76	.79	.81	.84	.87	.89	.92	.94	1.06	1.16
0.8	.92	.95	.99	1.03	1.06	1.10	1.13	1.16	1.19	1.33	1.46
1.0	1.10	1.14	1.18	1.23	1.27	1.31	1.35	1.38	1.42	1.59	1.74
1.2	1.28	1.32	1.37	1.42	1.46	1.51	1.55	1.60	1.64	1.83	2.01
1.4	1.42	1.48	1.54	1.59	1.65	1.70	1.75	1.80	1.84	2.07	2.26
1.6	1.58	1.64	1.70	1.76	1.82	1.88	1.94	1.99	2.04	2.29	2.51
1.8	1.72	1.79	1.86	1.93	1.99	2.06	2.12	2.17	2.23	2.50	2.74
2.0	1.87	1.94	2.02	2.09	2.16	2.22	2.29	2.35	2.41	2.70	2.96
2.2	2.00	2.08	2.16	2.24	2.31	2.39	2.46	2.52	2.59	2.90	3.17
2.4	2.13	2.22	2.31	2.39	2.47	2.54	2.62	2.69	2.76	3.09	3.38
2.6	2.26	2.36	2.45	2.53	2.62	2.70	2.78	2.85	2.93	3.27	3.59
2.8	2.39	2.49	2.58	2.67	2.76	2.85	2.93	3.01	3.09	3.45	3.79
3.0	2.51	2.61	2.72	2.81	2.90	2.99	3.08	3.16	3.25	3.63	3.98
3.2	2.63	2.74	2.84	2.94	3.04	3.13	3.22	3.31	3.40	3.80	4.16
3.4	2.75	2.86	2.97	3.07	3.17	3.27	3.36	3.46	3.55	3.97	4.34
3.6	2.86	2.98	3.09	3.20	3.30	3.41	3.50	3.60	3.69	4.13	4.52
3.8	2.98	3.10	3.21	3.33	3.43	3.54	3.64	3.74	3.84	4.29	4.70
4.0	3.09	3.21	3.33	3.45	3.56	3.67	3.77	3.88	3.98	4.45	4.87
4.2	3.19	3.32	3.45	3.57	3.68	3.80	3.91	4.01	4.12	4.60	5.04
4.4	3.30	3.43	3.56	3.69	3.80	3.92	4.04	4.14	4.25	4.75	5.20
4.6	3.40	3.54	3.67	3.80	3.92	4.04	4.16	4.27	4.38	4.90	5.36
4.8	3.50	3.65	3.78	3.92	4.04	4.16	4.29	4.40	4.51	5.05	5.52
5.0	3.60	3.75	3.89	4.03	4.16	4.28	4.41	4.53	4.64	5.19	5.68
5.2	3.70	3.85	4.00	4.14	4.27	4.40	4.53	4.65	4.77	5.33	5.83
5.4	3.80	3.95	4.10	4.24	4.38	4.52	4.65	4.77	4.89	5.47	5.99
5.6	3.90	4.05	4.20	4.35	4.49	4.63	4.76	4.89	5.02	5.60	6.14
5.8	3.99	4.15	4.31	4.46	4.60	4.74	4.88	5.01	5.14	5.74	6.28
6.0	4.09	4.25	4.41	4.56	4.71	4.85	4.99	5.13	5.26	5.87	6.43
6.2	4.18	4.34	4.51	4.66	4.81	4.96	5.10	5.24	5.38	6.00	6.57
6.4	4.27	4.44	4.60	4.76	4.92	5.07	5.21	5.35	5.49	6.13	6.71
6.6	4.36	4.53	4.70	4.86	5.02	5.17	5.32	5.47	5.61	6.26	6.85
6.8	4.45	4.62	4.80	4.96	5.13	5.28	5.43	5.58	5.72	6.39	6.99
7.0	4.53	4.72	4.90	5.06	5.23	5.38	5.54	5.69	5.83	6.51	7.13
7.5	4.74	4.94	5.13	5.30	5.48	5.63	5.80	5.95	6.10	6.81	7.46
8.0	4.95	5.16	5.35	5.53	5.72	5.88	6.05	6.21	6.37	7.11	7.79
8.5	5.16	5.37	5.57	5.76	5.95	6.12	6.30	6.46	6.63	7.40	8.10
9.0	5.36	5.57	5.78	5.98	6.17	6.35	6.54	6.71	6.88	7.69	8.41
9.5	5.56	5.77	5.99	6.19	6.39	6.58	6.77	6.95	7.13	7.96	8.71
10	5.75	5.97	6.18	6.40	6.60	6.81	7.00	7.19	7.36	8.23	9.00
11	6.11	6.35	6.58	6.81	7.03	7.24	7.44	7.64	7.82	8.75	9.57
12	6.45	6.72	6.97	7.20	7.43	7.66	7.87	8.08	8.26	9.25	10.1
13	6.78	7.07	7.33	7.58	7.82	8.06	8.28	8.51	8.69	9.73	10.7
14	7.11	7.41	7.68	7.94	8.20	8.44	8.68	8.92	9.11	10.2	11.2
15	7.44	7.74	8.02	8.30	8.56	8.82	9.07	9.31	9.53	10.7	11.7
16	7.77	8.06	8.35	8.64	8.92	9.18	9.44	9.70	9.94	11.1	12.2

Table 10.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*
n = .030—Continued.

r = area / wet per.	F = 0.24 S = .00175	F = 10.56 S = .002	F = 15.84 S = .003	F = 21.12 S = .004	F = 26.40 S = .005	F = 31.68 S = .006	F = 42.24 S = .008	F = 52.80 S = .010
0.2	.50	.53	.65	.76	.85	.93	1.07	1.20
0.4	.90	.96	1.18	1.37	1.53	1.68	1.94	2.17
0.6	1.26	1.34	1.65	1.91	2.13	2.34	2.70	3.02
0.8	1.58	1.69	2.08	2.40	2.69	2.94	3.40	3.80
1.0	1.89	2.02	2.48	2.86	3.20	3.51	4.05	4.53
1.2	2.17	2.33	2.85	3.30	3.69	4.04	4.67	5.22
1.4	2.45	2.62	3.21	3.71	4.15	4.54	5.25	5.87
1.6	2.71	2.90	3.55	4.10	4.59	5.02	5.80	6.49
1.8	2.96	3.16	3.88	4.48	5.01	5.49	6.34	7.08
2.0	3.20	3.42	4.19	4.84	5.41	5.93	6.85	7.65
2.2	3.43	3.67	4.49	5.19	5.80	6.36	7.34	8.21
2.4	3.65	3.91	4.79	5.53	6.18	6.77	7.82	8.75
2.6	3.87	4.14	5.07	5.86	6.55	7.18	8.29	9.27
2.8	4.08	4.37	5.35	6.18	6.91	7.57	8.74	9.77
3.0	4.29	4.59	5.62	6.49	7.26	7.95	9.18	10.3
3.2	4.50	4.81	5.89	6.80	7.60	8.32	9.61	10.7
3.4	4.70	5.02	6.14	7.09	7.93	8.69	10.0	11.2
3.6	4.89	5.22	6.39	7.38	8.25	9.04	10.4	11.7
3.8	5.08	5.42	6.64	7.67	8.57	9.39	10.8	12.1
4.0	5.26	5.62	6.88	7.95	8.88	9.73	11.2	12.6
4.2	5.44	5.81	7.12	8.22	9.19	10.1	11.6	13.0
4.4	5.62	6.00	7.35	8.49	9.49	10.4	12.0	13.4
4.6	5.79	6.19	7.58	8.75	9.78	10.7	12.4	13.8
4.8	5.96	6.38	7.80	9.01	10.1	11.0	12.8	14.2
5.0	6.13	6.56	8.02	9.26	10.4	11.3	13.1	14.6
5.2	6.30	6.73	8.24	9.51	10.6	11.7	13.5	15.0
5.4	6.47	6.91	8.46	9.76	10.9	12.0	13.8	15.4
5.6	6.63	7.08	8.67	10.0	11.2	12.3	14.1	15.8
5.8	6.79	7.25	8.87	10.3	11.5	12.5	14.5	16.2
6.0	6.94	7.42	9.08	10.5	11.7	12.8	14.8	16.6
6.2	7.10	7.58	9.28	10.7	12.0	13.1	15.1	16.9
6.4	7.25	7.75	9.48	11.0	12.2	13.4	15.5	17.3
6.6	7.40	7.91	9.67	11.2	12.5	13.7	15.8	17.6
6.8	7.55	8.08	9.87	11.4	12.7	14.0	16.1	18.0
7.0	7.70	8.24	10.1	11.6	13.0	14.2	16.4	18.3
7.5	8.05	8.62	10.6	12.2	13.6	14.9	17.2	19.2
8.0	8.40	9.00	11.0	12.7	14.2	15.5	17.9	20.3
8.5	8.74	9.38	11.5	13.2	14.8	16.2	18.6	20.8
9.0	9.08	9.74	11.9	13.7	15.3	16.8	19.3	21.6
9.5	9.40	10.1	12.3	14.2	15.9	17.4	20.0	22.4
10	9.72	10.4	12.7	14.7	16.4	17.9	20.7	23.1
11	10.3	11.1	13.5	15.6	17.4	19.1	22.0	24.6
12	10.9	11.7	14.3	16.5	18.4	20.1	23.3	26.0
13	11.5	12.2	15.0	17.3	19.4	21.2	24.5	27.3
14	12.0	12.9	15.7	18.1	20.3	22.2	25.6	28.5
15	12.6	13.5	16.4	18.9	21.2	23.2	26.8	29.9
16	13.1	14.1	17.1	19.7	22.0	24.1	27.8	31.1

Table 11.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

$n = .035$.

r = area / wet perimeter	s = .294 / i = .00005	s = .436 / i = .00010	s = .792 / i = .00025	s = 1.056 / i = .00040	s = 1.320 / i = .00065	s = 1.584 / i = .00090	s = 1.848 / i = .00125	s = 2.112 / i = .00160	s = 2.376 / i = .00205	s = 2.640 / i = .00260	s = 2.904 / i = .00325
0.2	.05	.08	.11	.13	.14	.16	.17	.19	.20	.21	.23
0.4	.10	.16	.20	.24	.27	.29	.32	.34	.37	.39	.41
0.6	.15	.23	.29	.34	.38	.41	.45	.48	.52	.55	.58
0.8	.20	.29	.37	.43	.48	.53	.58	.62	.66	.70	.73
1.0	.24	.35	.44	.51	.58	.64	.69	.74	.79	.83	.88
1.2	.28	.41	.51	.60	.67	.74	.80	.86	.92	.97	1.02
1.4	.32	.47	.58	.68	.76	.84	.91	.97	1.03	1.09	1.15
1.6	.36	.52	.65	.76	.85	.93	1.01	1.08	1.15	1.21	1.27
1.8	.40	.58	.72	.83	.93	1.02	1.11	1.19	1.26	1.33	1.40
2.0	.44	.63	.78	.90	1.01	1.11	1.20	1.29	1.37	1.44	1.52
2.2	.47	.68	.84	.97	1.09	1.20	1.30	1.39	1.47	1.55	1.63
2.4	.51	.73	.90	1.04	1.17	1.28	1.39	1.49	1.57	1.66	1.74
2.6	.55	.78	.96	1.11	1.24	1.36	1.47	1.58	1.67	1.76	1.85
2.8	.59	.83	1.02	1.18	1.32	1.44	1.56	1.67	1.77	1.86	1.96
3.0	.62	.87	1.07	1.24	1.39	1.52	1.64	1.75	1.86	1.96	2.06
3.2	.65	.92	1.13	1.30	1.45	1.59	1.72	1.84	1.95	2.06	2.16
3.4	.69	.97	1.18	1.36	1.52	1.67	1.80	1.92	2.04	2.15	2.26
3.6	.72	1.01	1.23	1.42	1.59	1.74	1.88	2.01	2.13	2.24	2.35
3.8	.75	1.05	1.29	1.48	1.66	1.81	1.96	2.09	2.22	2.33	2.45
4.0	.78	1.09	1.34	1.54	1.72	1.88	2.03	2.17	2.30	2.42	2.54
4.2	.81	1.14	1.39	1.60	1.78	1.95	2.10	2.25	2.38	2.51	2.62
4.4	.84	1.18	1.44	1.65	1.84	2.02	2.18	2.33	2.47	2.60	2.72
4.6	.87	1.22	1.48	1.71	1.90	2.08	2.25	2.40	2.55	2.68	2.81
4.8	.90	1.26	1.53	1.77	1.96	2.15	2.32	2.47	2.62	2.77	2.90
5.0	.93	1.30	1.58	1.82	2.02	2.21	2.39	2.54	2.70	2.86	2.98
5.2	.96	1.34	1.63	1.87	2.08	2.28	2.46	2.62	2.78	2.93	3.07
5.4	.99	1.38	1.67	1.92	2.14	2.34	2.52	2.69	2.85	3.01	3.15
5.6	1.02	1.42	1.72	1.97	2.20	2.40	2.59	2.76	2.93	3.08	3.23
5.8	1.05	1.46	1.76	2.02	2.25	2.46	2.65	2.83	3.00	3.16	3.31
6.0	1.08	1.49	1.81	2.07	2.31	2.52	2.72	2.90	3.07	3.24	3.39
6.2	1.11	1.53	1.85	2.12	2.36	2.58	2.78	2.97	3.15	3.31	3.47
6.4	1.14	1.57	1.89	2.17	2.42	2.64	2.85	3.04	3.22	3.39	3.55
6.6	1.17	1.60	1.94	2.22	2.47	2.70	2.91	3.10	3.29	3.46	3.63
6.8	1.19	1.64	1.98	2.27	2.52	2.76	2.97	3.17	3.36	3.53	3.71
7.0	1.22	1.67	2.02	2.31	2.58	2.82	3.03	3.23	3.42	3.60	3.78
7.5	1.29	1.76	2.12	2.43	2.71	2.97	3.18	3.39	3.59	3.78	3.96
8.0	1.35	1.84	2.22	2.54	2.83	3.10	3.32	3.54	3.75	3.95	4.14
8.5	1.42	1.93	2.32	2.65	2.95	3.22	3.46	3.70	3.91	4.12	4.31
9.0	1.48	2.01	2.42	2.76	3.07	3.35	3.60	3.84	4.07	4.28	4.48
9.5	1.54	2.09	2.51	2.87	3.19	3.47	3.74	3.99	4.22	4.44	4.65
10	1.60	2.17	2.60	2.97	3.30	3.60	3.87	4.13	4.37	4.60	4.82
11	1.73	2.32	2.78	3.17	3.52	3.84	4.13	4.40	4.66	4.90	5.13
12	1.84	2.46	2.95	3.37	3.73	4.07	4.38	4.66	4.93	5.20	5.45
13	1.96	2.61	3.12	3.56	3.94	4.30	4.61	4.92	5.20	5.48	5.73
14	2.07	2.75	3.28	3.74	4.14	4.51	4.85	5.16	5.46	5.75	6.01
15	2.17	2.89	3.44	3.91	4.33	4.72	5.07	5.40	5.71	6.01	6.29
16	2.28	3.02	3.59	4.08	4.52	4.92	5.29	5.63	5.96	6.27	6.56

Table 11.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .035—Continued.

Area in sq. ft. / Wet per.	R = 3.166 S = .00020	R = 3.457 S = .00025	R = 3.666 S = .00030	R = 3.900 S = .00035	R = 4.204 S = .00040	R = 4.468 S = .00045	R = 4.743 S = .00050	R = 5.016 S = .00055	R = 5.290 S = .00060	R = 5.69 S = .00075	R = 7.47 S = .00150
0.2	.23	.24	.25	.26	.27	.28	.29	.30	.32	.34	.37
0.4	.43	.45	.46	.48	.50	.51	.53	.54	.56	.62	.68
0.6	.60	.63	.65	.68	.70	.72	.74	.76	.78	.87	.96
0.8	.76	.80	.83	.86	.89	.91	.94	.97	.99	1.11	1.22
1.0	.92	.96	.99	1.03	1.06	1.10	1.13	1.16	1.19	1.33	1.46
1.2	1.06	1.11	1.15	1.19	1.23	1.27	1.31	1.34	1.38	1.54	1.69
1.4	1.20	1.25	1.30	1.34	1.39	1.43	1.48	1.52	1.56	1.74	1.91
1.6	1.33	1.39	1.44	1.49	1.54	1.59	1.64	1.68	1.73	1.93	2.12
1.8	1.46	1.52	1.58	1.63	1.69	1.74	1.79	1.84	1.89	2.12	2.32
2.0	1.58	1.65	1.71	1.77	1.83	1.89	1.94	2.00	2.05	2.29	2.51
2.2	1.70	1.77	1.84	1.91	1.97	2.03	2.09	2.15	2.20	2.46	2.70
2.4	1.82	1.89	1.97	2.04	2.10	2.17	2.23	2.29	2.35	2.63	2.88
2.6	1.93	2.01	2.09	2.16	2.23	2.30	2.37	2.43	2.50	2.79	3.06
2.8	2.04	2.13	2.21	2.28	2.36	2.43	2.50	2.57	2.64	2.95	3.23
3.0	2.15	2.24	2.32	2.40	2.48	2.56	2.63	2.71	2.78	3.10	3.40
3.2	2.25	2.35	2.44	2.52	2.60	2.68	2.76	2.84	2.91	3.25	3.57
3.4	2.36	2.45	2.55	2.64	2.72	2.80	2.89	2.97	3.04	3.40	3.73
3.6	2.46	2.56	2.65	2.75	2.84	2.92	3.01	3.09	3.17	3.55	3.88
3.8	2.56	2.66	2.76	2.86	2.95	3.04	3.13	3.22	3.30	3.69	4.04
4.0	2.65	2.76	2.87	2.97	3.06	3.16	3.25	3.34	3.42	3.82	4.19
4.2	2.75	2.86	2.97	3.07	3.17	3.27	3.36	3.45	3.54	3.96	4.34
4.4	2.84	2.96	3.07	3.18	3.28	3.38	3.48	3.57	3.66	4.10	4.49
4.6	2.93	3.05	3.17	3.28	3.38	3.49	3.59	3.69	3.78	4.23	4.63
4.8	3.02	3.15	3.27	3.38	3.49	3.60	3.70	3.80	3.90	4.36	4.77
5.0	3.11	3.24	3.36	3.48	3.59	3.70	3.81	3.91	4.01	4.48	4.91
5.2	3.20	3.33	3.46	3.58	3.69	3.80	3.91	4.02	4.12	4.61	5.04
5.4	3.29	3.42	3.55	3.67	3.79	3.91	4.02	4.13	4.23	4.73	5.18
5.6	3.37	3.51	3.64	3.77	3.89	4.01	4.12	4.23	4.34	4.85	5.31
5.8	3.45	3.60	3.73	3.86	3.99	4.11	4.23	4.34	4.45	4.97	5.44
6.0	3.54	3.68	3.82	3.95	4.08	4.20	4.33	4.44	4.56	5.09	5.57
6.2	3.62	3.77	3.91	4.04	4.17	4.30	4.43	4.54	4.66	5.21	5.70
6.4	3.70	3.85	4.00	4.13	4.27	4.40	4.53	4.65	4.77	5.33	5.83
6.6	3.78	3.94	4.08	4.22	4.36	4.49	4.62	4.75	4.87	5.44	5.95
6.8	3.86	4.02	4.17	4.31	4.45	4.59	4.72	4.84	4.97	5.55	6.07
7.0	3.94	4.10	4.25	4.40	4.54	4.68	4.81	4.94	5.07	5.66	6.19
7.5	4.13	4.30	4.46	4.61	4.76	4.90	5.04	5.18	5.31	5.93	6.49
8.0	4.32	4.49	4.66	4.82	4.97	5.12	5.27	5.41	5.55	6.20	6.78
8.5	4.50	4.68	4.85	5.02	5.18	5.34	5.49	5.64	5.78	6.46	7.06
9.0	4.68	4.86	5.04	5.22	5.38	5.55	5.70	5.86	6.01	6.71	7.34
9.5	4.85	5.04	5.23	5.41	5.58	5.75	5.92	6.08	6.23	6.96	7.61
10	5.02	5.22	5.41	5.60	5.78	5.95	6.12	6.29	6.45	7.20	7.87
11	5.35	5.56	5.77	5.96	6.16	6.34	6.52	6.70	6.87	7.66	8.38
12	5.67	5.89	6.11	6.32	6.52	6.71	6.91	7.09	7.27	8.11	8.89
13	5.97	6.21	6.44	6.66	6.87	7.08	7.28	7.47	7.66	8.55	9.37
14	6.27	6.52	6.76	6.99	7.21	7.42	7.63	7.84	8.04	8.97	9.82
15	6.56	6.82	7.06	7.30	7.54	7.76	7.98	8.20	8.40	9.37	10.3
16	6.84	7.11	7.36	7.61	7.86	8.09	8.32	8.54	8.76	9.77	10.7

Table 11.—*Velocity of water in feet per second, based on Kutter's formula, coefficient of roughness*

n = .035—Continued.

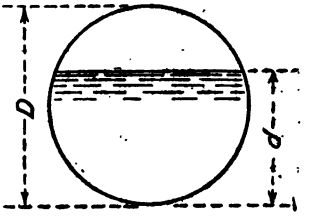
r = area ÷ wet per.	F=9.84 S=.00175	F=10.46 S=.002	F=15.94 S=.005	F=21.13 S=.008	F=26.19 S=.011	F=31.26 S=.014	F=42.24 S=.020	F=52.89 S=.026
0.2	.40	.43	.53	.62	.69	.76	.88	.98
0.4	.74	.79	.97	1.13	1.26	1.38	1.60	1.79
0.6	1.04	1.12	1.37	1.58	1.77	1.94	2.24	2.51
0.8	1.32	1.41	1.73	2.00	2.24	2.46	2.84	3.17
1.0	1.58	1.69	2.08	2.40	2.68	2.94	3.40	3.80
1.2	1.83	1.96	2.40	2.77	3.10	3.40	3.92	4.39
1.4	2.06	2.21	2.71	3.13	3.50	3.83	4.43	4.95
1.6	2.29	2.45	3.00	3.47	3.88	4.25	4.91	5.49
1.8	2.51	2.68	3.28	3.79	4.24	4.65	5.37	6.00
2.0	2.72	2.90	3.55	4.11	4.60	5.04	5.82	6.50
2.2	2.92	3.12	3.82	4.42	4.94	5.41	6.25	6.98
2.4	3.12	3.33	4.08	4.71	5.27	5.77	6.67	7.45
2.6	3.31	3.53	4.33	5.00	5.59	6.12	7.07	7.91
2.8	3.49	3.73	4.57	5.28	5.91	6.46	7.47	8.35
3.0	3.67	3.93	4.81	5.55	6.21	6.80	7.86	8.78
3.2	3.85	4.12	5.04	5.82	6.51	7.13	8.23	9.21
3.4	4.02	4.30	5.27	6.08	6.80	7.45	8.60	9.62
3.6	4.19	4.48	5.49	6.34	7.09	7.76	8.96	10.0
3.8	4.36	4.66	5.71	6.59	7.37	8.07	9.32	10.4
4.0	4.52	4.84	5.92	6.84	7.64	8.37	9.67	10.8
4.2	4.68	5.01	6.13	7.08	7.91	8.67	10.0	11.2
4.4	4.84	5.18	6.34	7.32	8.18	8.96	10.4	11.6
4.6	5.00	5.34	6.54	7.55	8.44	9.24	10.7	11.9
4.8	5.15	5.50	6.74	7.78	8.70	9.52	11.0	12.3
5.0	5.30	5.66	6.93	8.00	8.95	9.80	11.3	12.6
5.2	5.45	5.82	7.12	8.22	9.19	10.1	11.6	13.0
5.4	5.59	5.98	7.31	8.44	9.44	10.4	11.9	13.3
5.6	5.74	6.13	7.50	8.66	9.68	10.6	12.2	13.7
5.8	5.88	6.28	7.69	8.87	9.92	10.9	12.5	14.0
6.0	6.02	6.43	7.87	9.08	10.2	11.1	12.8	14.4
6.2	6.15	6.58	8.05	9.29	10.4	11.4	13.1	14.7
6.4	6.29	6.73	8.23	9.49	10.6	11.6	13.4	15.0
6.6	6.42	6.86	8.40	9.69	10.8	11.9	13.7	15.3
6.8	6.56	7.00	8.57	9.89	11.1	12.1	14.0	15.6
7.0	6.69	7.15	8.74	10.1	11.3	12.4	14.3	15.9
7.5	7.01	7.49	9.16	10.6	11.8	13.0	15.0	16.7
8.0	7.32	7.82	9.57	11.0	12.3	13.5	15.6	17.4
8.5	7.62	8.15	9.96	11.5	12.9	14.1	16.3	18.2
9.0	7.92	8.47	10.4	12.0	13.4	14.6	16.9	18.9
9.5	8.21	8.78	10.8	12.4	13.9	15.2	17.5	19.6
10	8.50	9.08	11.1	12.8	14.3	15.7	18.1	20.2
11	9.06	9.67	11.9	13.6	15.2	16.7	19.3	21.5
12	9.60	10.2	12.5	14.4	16.1	17.7	20.4	22.8
13	10.1	10.8	13.2	15.2	17.0	18.6	21.5	24.0
14	10.6	11.3	13.8	15.9	17.8	19.5	22.5	25.2
15	11.1	11.8	14.4	16.7	18.6	20.4	23.5	26.3
16	11.5	12.3	15.1	17.4	19.4	21.2	24.5	27.4

Table 12.—*Area, wetted perimeter, and hydraulic radius of partially filled circular conduit sections.*

$\frac{d}{D}$	area $\frac{}{D^2}$	wet. per. $\frac{}{D}$	hyd. rad. $\frac{}{D}$	$\frac{d}{D}$	area $\frac{}{D^2}$	wet. per. $\frac{}{D}$	hyd. rad. $\frac{}{D}$
0.01	0.0013	0.2003	0.0066	0.51	0.4027	1.5908	0.2531
0.02	0.0037	0.2838	0.0132	0.52	0.4127	1.6108	0.2561
0.03	0.0069	0.3482	0.0197	0.53	0.4227	1.6308	0.2591
0.04	0.0105	0.4027	0.0262	0.54	0.4327	1.6509	0.2620
0.05	0.0147	0.4510	0.0326	0.55	0.4426	1.6710	0.2649
0.06	0.0192	0.4949	0.0389	0.56	0.4526	1.6911	0.2676
0.07	0.0242	0.5355	0.0451	0.57	0.4625	1.7113	0.2703
0.08	0.0294	0.5735	0.0513	0.58	0.4723	1.7315	0.2728
0.09	0.0350	0.6094	0.0574	0.59	0.4822	1.7518	0.2753
0.10	0.0409	0.6435	0.0635	0.60	0.4920	1.7722	0.2776
0.11	0.0470	0.6761	0.0695	0.61	0.5018	1.7926	0.2797
0.12	0.0534	0.7075	0.0754	0.62	0.5115	1.8132	0.2818
0.13	0.0600	0.7377	0.0813	0.63	0.5212	1.8338	0.2839
0.14	0.0668	0.7670	0.0871	0.64	0.5308	1.8546	0.2860
0.15	0.0739	0.7954	0.0929	0.65	0.5404	1.8755	0.2881
0.16	0.0811	0.8230	0.0986	0.66	0.5499	1.8965	0.2899
0.17	0.0885	0.8500	0.1042	0.67	0.5594	1.9177	0.2917
0.18	0.0961	0.8763	0.1097	0.68	0.5687	1.9391	0.2935
0.19	0.1039	0.9020	0.1152	0.69	0.5780	1.9606	0.2950
0.20	0.1118	0.9273	0.1206	0.70	0.5872	1.9823	0.2962
0.21	0.1199	0.9521	0.1259	0.71	0.5964	2.0042	0.2973
0.22	0.1281	0.9764	0.1312	0.72	0.6054	2.0264	0.2984
0.23	0.1365	1.0003	0.1364	0.73	0.6143	2.0488	0.2995
0.24	0.1449	1.0239	0.1416	0.74	0.6231	2.0714	0.3006
0.25	0.1535	1.0472	0.1466	0.75	0.6318	2.0944	0.3017
0.26	0.1623	1.0701	0.1516	0.76	0.6404	2.1176	0.3025
0.27	0.1711	1.0928	0.1566	0.77	0.6489	2.1412	0.3032
0.28	0.1800	1.1152	0.1614	0.78	0.6573	2.1652	0.3037
0.29	0.1890	1.1373	0.1662	0.79	0.6655	2.1895	0.3040
0.30	0.1982	1.1593	0.1709	0.80	0.6736	2.2143	0.3042
0.31	0.2074	1.1810	0.1755	0.81	0.6815	2.2395	0.3044
0.32	0.2167	1.2025	0.1801	0.82	0.6893	2.2653	0.3043
0.33	0.2260	1.2239	0.1848	0.83	0.6969	2.2916	0.3041
0.34	0.2355	1.2451	0.1891	0.84	0.7043	2.3186	0.3038
0.35	0.2450	1.2661	0.1935	0.85	0.7115	2.3462	0.3033
0.36	0.2546	1.2870	0.1978	0.86	0.7186	2.3746	0.3026
0.37	0.2642	1.3078	0.2020	0.87	0.7254	2.4038	0.3017
0.38	0.2739	1.3284	0.2061	0.88	0.7320	2.4341	0.3008
0.39	0.2836	1.3490	0.2102	0.89	0.7384	2.4655	0.2996
0.40	0.2934	1.3694	0.2142	0.90	0.7445	2.4981	0.2980
0.41	0.3032	1.3898	0.2181	0.91	0.7504	2.5322	0.2963
0.42	0.3130	1.4101	0.2220	0.92	0.7560	2.5681	0.2944
0.43	0.3229	1.4303	0.2257	0.93	0.7642	2.6061	0.2922
0.44	0.3328	1.4505	0.2294	0.94	0.7662	2.6467	0.2896
0.45	0.3428	1.4706	0.2331	0.95	0.7707	2.6906	0.2864
0.46	0.3527	1.4907	0.2366	0.96	0.7749	2.7389	0.2830
0.47	0.3627	1.5108	0.2400	0.97	0.7785	2.7934	0.2787
0.48	0.3727	1.5308	0.2434	0.98	0.7816	2.8578	0.2735
0.49	0.3827	1.5508	0.2467	0.99	0.7841	2.9412	0.2665
0.50	0.3927	1.5708	0.2500	1.00	0.7854	3.1416	0.2500

Table 12a.—*Velocity head and discharge at critical depths and static pressures in circular conduits partly full.*

D= Diameter of circle.
d= Depth of water.
hv= Velocity head for a critical depth of d.
Q= Discharge when the critical depth is d.
P= Pressure on cross section of water prism in cubic units of water. To get P in pounds, when d and D are in feet, multiply by 62.5. See explanation, page 48-d.



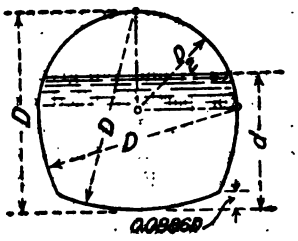
$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$	$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$	$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$
1	2	3	4	1	2	3	4	1	2	3	4
.01	.0033	.0006	.0000	.34	.1243	.6657	.0332	.67	.2974	2.4464	.1644
.02	.0067	.0025	.0000	.35	.1284	.7040	.0356	.68	.3048	2.5182	.1700
.03	.0101	.0056	.0001	.36	.1326	.7433	.0381	.69	.3125	2.5912	.1758
.04	.0134	.0098	.0002	.37	.1368	.7836	.0407	.70	.3204	2.6656	.1818
.05	.0168	.0153	.0003	.38	.1411	.8249	.0434	.71	.3286	2.7414	.1875
.06	.0203	.0220	.0005	.39	.1454	.8671	.0462	.72	.3371	2.8188	.1935
.07	.0237	.0298	.0007	.40	.1497	.9103	.0491	.73	.3459	2.8977	.1996
.08	.0271	.0389	.0010	.41	.1541	.9545	.0520	.74	.3552	2.9783	.2058
.09	.0306	.0491	.0013	.42	.1586	.9996	.0551	.75	.3648	3.0607	.2121
.10	.0341	.0605	.0017	.43	.1631	1.0458	.0583	.76	.3749	3.1450	.2185
.11	.0376	.0731	.0021	.44	.1676	1.0929	.0616	.77	.3855	3.2314	.2249
.12	.0411	.0868	.0026	.45	.1723	1.1410	.0650	.78	.3967	3.3200	.2314
.13	.0446	.1016	.0032	.46	.1769	1.1899	.0684	.79	.4085	3.4112	.2380
.14	.0482	.1176	.0038	.47	.1817	1.2399	.0720	.80	.4210	3.5050	.2447
.15	.0517	.1347	.0045	.48	.1865	1.2908	.0757	.81	.4343	3.6019	.2515
.16	.0553	.1530	.0053	.49	.1914	1.3427	.0795	.82	.4485	3.7021	.2584
.17	.0589	.1724	.0061	.50	.1964	1.3955	.0833	.83	.4638	3.8061	.2653
.18	.0626	.1928	.0070	.51	.2014	1.4493	.0873	.84	.4803	3.9144	.2723
.19	.0662	.2144	.0080	.52	.2065	1.5041	.0914	.85	.4982	4.0276	.2794
.20	.0699	.2371	.0091	.53	.2117	1.5598	.0956	.86	.5177	4.1465	.2865
.21	.0736	.2609	.0103	.54	.2170	1.6164	.0998	.87	.5392	4.2721	.2938
.22	.0773	.2857	.0115	.55	.2224	1.6735	.1042	.88	.5632	4.4056	.3011
.23	.0811	.3116	.0128	.56	.2279	1.7327	.1087	.89	.5900	4.5486	.3084
.24	.0848	.3386	.0143	.57	.2335	1.7923	.1133	.90	.6204	4.7033	.3158
.25	.0887	.3667	.0157	.58	.2393	1.8530	.1179	.91	.6555	4.8725	.3233
.26	.0925	.3957	.0173	.59	.2451	1.9146	.1227	.92	.6966	5.0603	.3308
.27	.0963	.4259	.0190	.60	.2511	1.9773	.1276	.93	.7450	5.2725	.3384
.28	.1002	.4571	.0207	.61	.2572	2.0409	.1326	.94	.8065	5.5133	.3460
.29	.1042	.4893	.0226	.62	.2635	2.1057	.1376	.95	.8841	5.8118	.3537
.30	.1081	.5225	.0255	.63	.2699	2.1716	.1428	.96	.9885	6.1787	.3615
.31	.1121	.5568	.0266	.64	.2765	2.2386	.1481	.97	1.1410	6.6692	.3692
.32	.1161	.5921	.0287	.65	.2833	2.3067	.1534	.98	1.3958	7.4068	.3770
.33	.1202	.6284	.0309	.66	.2902	2.3760	.1589	.99	1.9760	8.8268	.3848
								1.00	.....	.....	.3927

Table 12b.—*Area, wetted perimeter and hydraulic radius of partially filled horseshoe conduit sections.*

d/D	Area/D²	wet. per./D	hyd. rad./D	d/D	Area/D²	wet. per./D	hyd. rad./D
0.01	0.0019	0.2820	0.0066	0.51	0.4466	1.7162	0.2602
0.02	0.0053	0.4006	0.0132	0.52	0.4586	1.7362	0.2640
0.03	0.0097	0.4911	0.0198	0.53	0.4696	1.7562	0.2657
0.04	0.0150	0.5676	0.0264	0.54	0.4795	1.7763	0.2683
0.05	0.0209	0.6351	0.0329	0.55	0.4885	1.7964	0.2707
0.06	0.0275	0.6963	0.0394	0.56	0.4965	1.8165	0.2733
0.07	0.0346	0.7528	0.0459	0.57	0.5064	1.8367	0.2757
0.08	0.0421	0.8054	0.0524	0.58	0.5163	1.8569	0.2781
0.0886	0.0491	0.8482	0.0578	0.59	0.5261	1.8772	0.2804
0.09	0.0502	0.8513	0.0590	0.60	0.5359	1.8976	0.2824
0.10	0.0585	0.8732	0.0670				
				0.61	0.5457	1.9180	0.2844
0.11	0.0670	0.8950	0.0748	0.62	0.5555	1.9386	0.2864
0.12	0.0753	0.9166	0.0823	0.63	0.5651	1.9592	0.2884
0.13	0.0839	0.9382	0.0895	0.64	0.5748	1.9800	0.2902
0.14	0.0925	0.9597	0.0964	0.65	0.5843	2.0009	0.2920
0.15	0.1012	0.9811	0.1031				
				0.66	0.5938	2.0219	0.2937
0.16	0.1100	1.0024	0.1097	0.67	0.6033	2.0431	0.2953
0.17	0.1188	1.0236	0.1161	0.68	0.6126	2.0645	0.2967
0.18	0.1277	1.0448	0.1222	0.69	0.6219	2.0860	0.2981
0.19	0.1367	1.0658	0.1282	0.70	0.6312	2.1077	0.2994
0.20	0.1457	1.0868	0.1341				
				0.71	0.6403	2.1297	0.3006
0.21	0.1549	1.1078	0.1398	0.72	0.6493	2.1518	0.3018
0.22	0.1640	1.1286	0.1454	0.73	0.6582	2.1742	0.3028
0.23	0.1733	1.1494	0.1508	0.74	0.6671	2.1969	0.3036
0.24	0.1825	1.1702	0.1560	0.75	0.6758	2.2198	0.3044
0.25	0.1919	1.1909	0.1611				
				0.76	0.6844	2.2431	0.3050
0.26	0.2013	1.2115	0.1662	0.77	0.6929	2.2666	0.3055
0.27	0.2107	1.2321	0.1710	0.78	0.7012	2.2906	0.3060
0.28	0.2202	1.2526	0.1758	0.79	0.7094	2.3149	0.3064
0.29	0.2297	1.2731	0.1804	0.80	0.7175	2.3397	0.3067
0.30	0.2393	1.2935	0.1850				
				0.81	0.7254	2.3650	0.3067
0.31	0.2489	1.3139	0.1895	0.82	0.7332	2.3907	0.3066
0.32	0.2586	1.3342	0.1938	0.83	0.7408	2.4170	0.3064
0.33	0.2683	1.3546	0.1981	0.84	0.7482	2.4440	0.3061
0.34	0.2780	1.3748	0.2023	0.85	0.7554	2.4716	0.3056
0.35	0.2878	1.3951	0.2063				
				0.86	0.7625	2.5000	0.3050
0.36	0.2975	1.4153	0.2103	0.87	0.7693	2.5292	0.3042
0.37	0.3074	1.4355	0.2142	0.88	0.7759	2.5595	0.3032
0.38	0.3172	1.4556	0.2181	0.89	0.7823	2.5909	0.3020
0.39	0.3271	1.4758	0.2217	0.90	0.7884	2.6235	0.3005
0.40	0.3370	1.4959	0.2252				
				0.91	0.7943	2.6576	0.2988
0.41	0.3469	1.5160	0.2287	0.92	0.7999	2.6935	0.2969
0.42	0.3568	1.5360	0.2322	0.93	0.8052	2.7315	0.2947
0.43	0.3667	1.5561	0.2356	0.94	0.8101	2.7721	0.2922
0.44	0.3767	1.5761	0.2390	0.95	0.8146	2.8160	0.2893
0.45	0.3867	1.5962	0.2422				
				0.96	0.8188	2.8643	0.2858
0.46	0.3966	1.6162	0.2454	0.97	0.8224	2.9188	0.2816
0.47	0.4066	1.6362	0.2484	0.98	0.8256	2.9832	0.2766
0.48	0.4166	1.6562	0.2514	0.99	0.8280	3.0667	0.2699
0.49	0.4266	1.6762	0.2544	1.00	0.8293	3.2670	0.2538
0.50	0.4366	1.6963	0.2574				

Table 12-c.—*Velocity head and discharge at critical depths and static pressures in horseshoe conduits partly full.*

D= Diameter of horseshoe.
d= Depth of water.
hv= Velocity head for a critical depth of d.
Q= Discharge when the critical depth is d.
P= Pressure on cross section of water prism in cubic units of water. To get P in pounds, when d and D are in feet, multiply by 62.5. See explanation, page 48-d.



$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$	$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$	$\frac{d}{D}$	$\frac{hv}{D}$	$\frac{Q}{D^{\frac{5}{2}}}$	$\frac{P}{D^3}$
1	2	3	4	1	2	3	4	1	2	3	4
.01	.0033	.0009	.0000	.35	.1472	.8854	.0449	.69	.3362	2.8922	.1999
.02	.0067	.0035	.0000	.36	.1518	.9296	.0478	.70	.3443	2.9702	.2062
.03	.0100	.0079	.0001	.37	.1563	.9746	.0508	.71	.3528	3.0499	.2125
.04	.0134	.0139	.0002	.38	.1609	1.0205	.0540	.72	.3615	3.1311	.2190
.05	.0168	.0217	.0004	.39	.1655	1.0673	.0572	.73	.3707	3.2140	.2255
.06	.0201	.0312	.0007	.40	.1702	1.1148	.0605	.74	.3802	3.2987	.2321
.07	.0235	.0425	.0010	.41	.1749	1.1633	.0639	.75	.3902	3.3853	.2385
.08	.0269	.0554	.0014	.42	.1795	1.2125	.0675	.76	.4006	3.4740	.2457
.09	.0305	.0703	.0018	.43	.1843	1.2626	.0711	.77	.4116	3.5650	.2525
.10	.0351	.0879	.0024	.44	.1890	1.3135	.0748	.78	.4232	3.6584	.2595
.11	.0397	.1069	.0030	.45	.1938	1.3652	.0786	.79	.4354	3.7544	.2666
.12	.0443	.1272	.0037	.46	.1986	1.4178	.0825	.80	.4484	3.8534	.2737
.13	.0489	.1487	.0045	.47	.2035	1.4712	.0865	.81	.4623	3.9557	.2809
.14	.0534	.1714	.0054	.48	.2084	1.5253	.0907	.82	.4771	4.0616	.2882
.15	.0579	.1953	.0063	.49	.2133	1.5803	.0949	.83	.4930	4.1716	.2956
.16	.0624	.2203	.0074	.50	.2183	1.6361	.0992	.84	.5102	4.2863	.3030
.17	.0669	.2465	.0085	.51	.2234	1.6928	.1036	.85	.5289	4.4063	.3105
.18	.0714	.2736	.0098	.52	.2285	1.7505	.1081	.86	.5494	4.5325	.3181
.19	.0758	.3019	.0111	.53	.2337	1.8092	.1127	.87	.5719	4.6660	.3258
.20	.0803	.3312	.0125	.54	.2391	1.8688	.1174	.88	.5969	4.8080	.3335
.21	.0847	.3615	.0140	.55	.2445	1.9294	.1223	.89	.6251	4.9605	.3413
.22	.0891	.3928	.0156	.56	.2500	1.9911	.1272	.90	.6570	5.1256	.3492
.23	.0936	.4251	.0173	.57	.2557	2.0537	.1322	.91	.6939	5.3065	.3572
.24	.0980	.4583	.0191	.58	.2615	2.1174	.1373	.92	.7371	5.5077	.3653
.25	.1024	.4926	.0210	.59	.2674	2.1821	.1425	.93	.7889	5.7304	.3733
.26	.1069	.5277	.0229	.60	.2735	2.2479	.1478	.94	.8528	5.9906	.3813
.27	.1113	.5638	.0250	.61	.2797	2.3148	.1532	.95	.9345	6.3157	.3894
.28	.1158	.6009	.0271	.62	.2861	2.3828	.1587	.96	1.0446	6.7114	.3976
.29	.1202	.6389	.0294	.63	.2926	2.4519	.1643	.97	1.2053	7.2417	.4058
.30	.1247	.6777	.0317	.64	.2994	2.5221	.1700	.98	1.4742	8.0392	.4140
.31	.1292	.7175	.0342	.65	.3063	2.5936	.1758	.99	2.0804	9.5780	.4223
.32	.1337	.7582	.0367	.66	.3134	2.6663	.1817	1.00	.....	.....	.4306
.33	.1382	.7997	.0393	.67	.3208	2.7402	.1877				
.34	.1427	.8421	.0421	.68	.3283	2.8155	.1937				

EXPLANATION OF TABLES 12, 12a, 12b, AND 12c.

Tables 12 and 12b give areas, wetted perimeters, and hydraulic radii for partially filled circular and horseshoe conduit sections, respectively. These tables, by George Henry Ellis, assistant engineer, United States Reclamation Service, were originally published in Engineering News, June 17, 1915, volume 73, page 1182.

Where horseshoe or circular cross sections are used the labor of testing for the critical depth or the hydraulic jump is materially reduced by use of Tables 12a and 12c, which are supplementary to tables 12 and 12b.

For example, suppose that it is desired to find the critical depth for 650 c. f. s. flowing free in a 9-foot diameter circular conduit.

$$\frac{Q}{D^{\frac{5}{2}}}=\frac{650}{243}=2.675.$$

Entering Table 12a, column 3, with this value, by interpolation the corresponding value in column 1 is found of

$$\frac{d}{D}=0.701.$$

The critical depth is therefore

$$d=9\times 0.701=6.31 \text{ feet.}$$

The critical velocity head is likewise found from column 2 to be

$$hv=.3214\times 9=2.893 \text{ feet,}$$

which gives a critical velocity of

$$V=13.63 \text{ feet per second.}$$

This information determines whether flow at a given point is above or below critical depth, and provision may be made for any contingency likely to occur.

Column 4 gives the hydrostatic pressure upon the cross section of the water prism. The tabular values must be multiplied by D^3 to give pressures in cubic units of water. If the pressure is required in pounds, multiply the tabular value by $62.5\ D^3$.

Table 12c is identical with Table 12a except that it is computed for a horseshoe section of the proportions indicated. These two tables are subject to an error of one unit in the last digit.

Table 18.—*Area in square feet, A, and hydraulic radius in feet, r, of semicircular flumes for various values of freeboard in feet, F.*

Flume No.	Diameter in feet	F=0.0		F=0.1		F=0.2		F=0.3		F=0.4	
		A	r	A	r	A	r	A	r	A	r
24	1.273	0.64	0.32	0.51	0.28	0.39	0.24	0.27	0.20	.....	.....
30	1.592	1.00	0.40	0.84	0.36	0.68	0.32	0.53	0.28	0.38	0.23
36	1.910	1.43	0.48	1.24	0.44	1.05	0.41	0.87	0.36	0.69	0.32
42	2.228	1.95	0.55	1.72	0.53	1.50	0.48	1.29	0.45	1.08	0.40
48	2.546	2.55	0.64	2.29	0.60	2.04	0.57	1.79	0.53	1.54	0.49
60	3.183	3.98	0.80	3.66	0.76	3.34	0.73	3.03	0.69	2.72	0.66
72	3.820	5.73	0.96	5.35	0.92	4.97	0.89	4.59	0.85	4.21	0.81
84	4.456	7.80	1.11	7.35	1.08	6.91	1.05	6.47	1.01	6.03	0.98
96	5.093	10.2	1.27	9.68	1.24	9.17	1.21	8.66	1.17	8.16	1.13
108	5.730	12.9	1.43	12.3	1.40	11.8	1.29	11.2	1.33	10.6	1.29
120	6.366	15.9	1.59	15.3	1.56	14.6	1.53	14.0	1.49	13.4	1.45
132	7.003	19.3	1.75	18.6	1.72	17.9	1.69	17.2	1.65	16.5	1.61
144	7.639	22.9	1.91	22.2	1.88	21.4	1.84	20.6	1.81	19.9	1.77
156	8.276	26.9	2.07	26.1	2.04	25.2	2.00	24.4	1.97	23.6	1.93
168	8.913	31.2	2.23	30.3	2.18	29.4	2.16	28.5	2.13	27.6	2.09
180	9.549	35.8	2.39	34.9	2.35	33.9	2.32	32.9	2.29	32.0	2.25
192	10.186	40.7	2.54	39.7	2.51	38.7	2.48	37.7	2.45	36.7	2.42
204	10.823	46.0	2.70	44.9	2.68	43.8	2.64	42.8	2.61	41.7	2.57
216	11.459	51.6	2.86	50.4	2.81	49.3	2.80	48.1	2.76	47.0	2.73
228	12.096	57.5	3.02	56.2	2.99	55.0	2.96	53.8	2.93	52.6	2.89
240	12.732	63.7	3.18	62.4	3.15	61.1	3.12	59.8	3.08	58.6	3.05
252	13.369	70.2	3.34	68.9	3.31	67.5	3.26	66.2	3.24	64.8	3.21

Flume No.	Diameter in feet	F=0.5		F=0.6		F=0.7		F=0.8		F=0.9	
		A	r	A	r	A	r	A	r	A	r
30	1.592	0.25	0.18	.....	.....	.....	.....	.....	.....	.....	.....
36	1.910	0.52	0.27	.....	.....	.....	.....	.....	.....	.....	.....
42	2.228	0.87	0.36	0.68	0.31	.....	.....	.....	.....	.....	.....
48	2.546	1.31	0.44	1.08	0.39	0.85	0.34	.....	.....	.....	.....
60	3.183	2.41	0.61	2.11	0.56	1.82	0.51	1.54	0.46	.....	.....
72	3.820	3.84	0.77	3.48	0.73	3.12	0.68	2.76	0.64	2.42	0.59
84	4.456	5.59	0.93	5.16	0.89	4.73	0.85	4.31	0.80	3.90	0.76
96	5.093	7.66	1.09	7.16	1.06	6.67	1.01	6.18	0.97	5.70	0.93
108	5.730	10.0	1.26	9.48	1.22	8.92	1.18	8.37	1.14	7.82	1.09
120	6.366	12.7	1.42	12.1	1.38	11.5	1.34	10.9	1.30	10.3	1.25
132	7.003	15.8	1.58	15.1	1.54	14.4	1.50	13.7	1.46	13.0	1.42
144	7.639	19.1	1.74	18.4	1.70	17.6	1.66	16.9	1.62	16.1	1.58
156	8.276	22.8	1.90	21.9	1.86	21.1	1.82	20.3	1.79	19.5	1.74
168	8.913	26.7	2.06	25.9	2.02	25.0	1.98	24.1	1.95	23.2	1.91
180	9.549	31.0	2.22	30.1	2.18	29.1	2.14	28.2	2.11	27.3	2.07
192	10.186	35.7	2.38	34.6	2.34	33.6	2.31	32.6	2.27	31.6	2.23
204	10.823	40.6	2.54	39.5	2.50	38.4	2.46	37.4	2.43	36.3	2.39
216	11.459	45.8	2.70	44.7	2.66	43.6	2.62	42.4	2.59	41.3	2.55
228	12.096	51.4	2.86	50.2	2.82	49.0	2.78	47.8	2.75	46.6	2.71
240	12.732	57.3	3.01	56.0	2.98	54.8	2.94	53.5	2.91	52.2	2.87
252	13.369	63.5	3.18	62.2	3.14	60.8	3.10	59.4	3.07	58.2	3.03

Table 13.—*Area in square feet, A, and hydraulic radius in feet, r, of semicircular flumes for various values of freeboard in feet, F*—Con.

Flume No.	Diameter in feet	F=1.0		F=1.1		F=1.2		F=1.3		F=1.4		F=1.5	
		A	*r*	*A*	*r*	*A*	*r*	*A*	*r*	*A*	*r*	*A*	*r*
72	3.820	2.68	0.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
84	4.456	3.49	0.71	3.10	0.66	2.71	0.61	.....	.....	.....	.....	.....	.....
96	5.093	5.22	0.88	4.76	0.83	4.30	0.78	3.85	0.73	3.41	0.68	.....	.....
108	5.730	7.23	1.05	6.74	1.00	6.22	0.96	5.70	0.91	5.19	0.86	4.69	0.81
120	6.366	9.65	1.21	9.05	1.16	8.46	1.12	7.87	1.08	7.29	1.03	6.72	0.98
132	7.003	12.4	1.38	11.7	1.33	11.0	1.29	10.4	1.24	9.72	1.20	9.07	1.15
144	7.639	15.4	1.54	14.6	1.50	13.9	1.46	13.2	1.41	12.5	1.37	11.8	1.32
156	8.276	18.7	1.70	17.9	1.66	17.1	1.62	16.3	1.58	15.5	1.53	14.8	1.49
168	8.913	22.4	1.87	21.5	1.82	20.6	1.78	19.8	1.74	18.9	1.70	18.1	1.65
180	9.549	26.3	2.03	25.4	1.99	24.5	1.95	23.5	1.90	22.6	1.86	21.7	1.82
192	10.186	30.6	2.19	29.6	2.15	28.6	2.11	27.6	2.07	26.7	2.03	25.7	1.98
204	10.823	35.2	2.36	34.2	2.31	33.1	2.27	32.1	2.23	31.0	2.19	30.0	2.14
216	11.459	40.2	2.51	39.0	2.47	37.9	2.43	36.8	2.39	35.7	2.35	34.6	2.31
228	12.096	45.4	2.67	44.2	2.64	43.0	2.60	41.9	2.56	40.7	2.52	39.5	2.47
240	12.732	51.0	2.83	49.7	2.80	48.5	2.76	47.2	2.72	46.0	2.68	44.7	2.63
252	13.369	56.9	2.99	55.5	2.96	54.2	2.92	52.9	2.88	51.6	2.84	50.3	2.80

Table 14.—*Area in square feet, A, and hydraulic radius in feet, r, of rectangular channels.*

Depth, feet	Bottom width 4 feet		Bottom width 6 feet		Bottom width 8 feet		Bottom width 10 feet		Bottom width 12 feet		Bottom width 14 feet	
	A	$r=\frac{\text{area}}{\text{wet per.}}$	*A*	$r=\frac{\text{area}}{\text{wet per.}}$	*A*	$r=\frac{\text{area}}{\text{wet per.}}$	*A*	$r=\frac{\text{area}}{\text{wet per.}}$	*A*	$r=\frac{\text{area}}{\text{wet per.}}$	*A*	$r=\frac{\text{area}}{\text{wet per.}}$
1.0	4	.67	6	.75	8	.80	10	.83	12	.86	14	.88
1.5	6	.86	9	1.00	12	1.09	15	1.15	18	1.20	21	1.24
2.0	8	1.00	12	1.20	16	1.33	20	1.43	24	1.50	28	1.56
2.5	10	1.11	15	1.36	20	1.54	25	1.67	30	1.76	35	1.84
3.0	12	1.20	18	1.50	24	1.71	30	1.88	36	2.00	42	2.10
3.5	14	1.27	21	1.62	28	1.87	35	2.06	42	2.21	49	2.33
4.0	16	1.33	24	1.71	32	2.00	40	2.22	48	2.40	56	2.55
4.5	18	1.38	27	1.80	36	2.12	45	2.37	54	2.57	63	2.74
5.0	20	1.43	30	1.88	40	2.22	50	2.50	60	2.73	70	2.92
5.5	22	1.47	33	1.94	44	2.32	55	2.62	66	2.88	77	3.08
6.0	24	1.50	36	2.00	48	2.40	60	2.73	72	3.00	84	3.22
6.5	26	1.53	39	2.05	52	2.48	65	2.83	78	3.12	91	3.27
7.0	28	1.56	42	2.10	56	2.55	70	2.92	84	3.23	98	3.50
7.5	30	1.58	45	2.14	60	2.61	75	3.00	90	3.33	105	3.62
8.0	32	1.60	48	2.18	64	2.67	80	3.08	96	3.43	112	3.73
8.5	34	1.62	51	2.22	68	2.72	85	3.15	102	3.52	119	3.84
9.0	36	1.64	54	2.25	72	2.77	90	3.21	108	3.60	126	3.94
9.5	38	1.65	57	2.28	76	2.82	95	3.28	114	3.68	133	4.03
10.0	40	1.67	60	2.31	80	2.86	100	3.33	120	3.75	140	4.12

Table 14.—*Area in square feet, A, and hydraulic radius in feet, r, of rectangular channels*—Continued.

Depth, feet	Bottom width 16 feet		Bottom width 18 feet		Bottom width 20 feet		Bottom width 25 feet		Bottom width 30 feet		Bottom width 40 feet	
	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$
1.0	16	.89	18	.90	20	.91	25	.93	30	.94	40	.95
1.5	24	1.26	27	1.29	30	1.30	38	1.34	45	1.36	60	1.40
2.0	32	1.60	36	1.64	40	1.67	50	1.72	60	1.77	80	1.82
2.5	40	1.90	45	1.95	50	2.00	62	2.08	75	2.14	100	2.22
3.0	48	2.18	54	2.25	60	2.31	75	2.42	90	2.50	120	2.61
3.5	56	2.35	63	2.52	70	2.59	88	2.73	105	2.84	140	2.98
4.0	64	2.67	72	2.77	80	2.86	100	3.03	120	3.16	160	3.33
4.5	72	2.88	81	3.00	90	3.10	112	3.31	135	3.46	180	3.67
5.0	80	3.08	90	3.21	100	3.33	125	3.57	150	3.75	200	4.00
5.5	88	3.26	99	3.42	110	3.55	138	3.83	165	4.03	220	4.31
6.0	96	3.43	108	3.60	120	3.75	150	4.05	180	4.29	240	4.61
6.5	104	3.59	117	3.78	130	3.94	162	4.27	195	4.54	260	4.91
7.0	112	3.73	126	3.94	140	4.12	175	4.48	210	4.77	280	5.18
7.5	120	3.87	135	4.09	150	4.29	188	4.69	225	5.00	300	5.46
8.0	128	4.00	144	4.24	160	4.44	200	4.88	240	5.22	320	5.71
8.5	136	4.12	153	4.37	170	4.59	212	5.06	255	5.43	340	5.96
9.0	144	4.24	162	4.50	180	4.74	225	5.23	270	5.63	360	6.21
9.5	152	4.34	171	4.62	190	4.87	238	5.40	285	5.82	380	6.44
10.0	160	4.44	180	4.74	200	5.00	250	5.56	300	6.00	400	6.67

Depth, feet	Bottom width 50 feet		Bottom width 60 feet		Bottom width 70 feet		Bottom width 80 feet		Bottom width 90 feet		Bottom width 100 feet	
	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$	A	$r=\frac{\text{area}}{\text{wet per.}}$
1.0	50	.96	60	.97	70	.97	80	.98	90	.98	100	.98
1.5	75	1.42	90	1.43	105	1.44	120	1.45	135	1.45	150	1.46
2.0	100	1.85	120	1.88	140	1.89	160	1.91	180	1.92	200	1.92
2.5	125	2.27	150	2.31	175	2.33	200	2.35	225	2.37	250	2.38
3.0	150	2.68	180	2.73	210	2.76	240	2.79	270	2.81	300	2.83
3.5	175	3.07	210	3.13	245	3.18	280	3.22	315	3.25	350	3.27
4.0	200	3.45	240	3.53	280	3.59	320	3.64	360	3.67	400	3.70
4.5	225	3.81	270	3.91	315	3.99	360	4.04	405	4.09	450	4.13
5.0	250	4.17	300	4.29	350	4.38	400	4.44	450	4.50	500	4.55
5.5	275	4.51	330	4.65	385	4.75	440	4.83	495	4.90	550	4.95
6.0	300	4.84	360	5.00	420	5.12	480	5.22	540	5.29	600	5.36
6.5	325	5.16	390	5.34	455	5.48	520	5.59	585	5.68	650	5.75
7.0	350	5.47	420	5.68	490	5.83	560	5.96	630	6.06	700	6.14
7.5	375	5.77	450	6.00	525	6.18	600	6.32	675	6.43	750	6.52
8.0	400	6.06	480	6.32	560	6.51	640	6.67	720	6.79	800	6.90
8.5	425	6.34	510	6.62	595	6.84	680	7.01	765	7.15	850	7.26
9.0	450	6.62	540	6.92	630	7.16	720	7.35	810	7.50	900	7.63
9.5	475	6.88	570	7.23	665	7.47	760	7.66	855	7.84	950	7.98
10.0	500	7.14	600	7.50	700	7.78	800	8.00	900	8.18	1000	8.33

Table 15.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1.

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	2.4	0.88	.30	3.4	1.28	.33	4.4	1.68	.34	5.4	2.08	.35
0.6	2.6	1.38	.41	3.6	1.98	.46	4.6	2.58	.48	5.6	3.18	.50
0.8	2.8	1.92	.51	3.8	2.72	.57	4.8	3.52	.61	5.8	4.32	.64
1.0	3.0	2.50	.59	4.0	3.50	.67	5.0	4.50	.72	6.0	5.50	.76
1.2	3.2	3.12	.67	4.2	4.32	.76	5.2	5.52	.83	6.2	6.72	.87
1.4	3.4	3.78	.74	4.4	5.18	.85	5.4	6.58	.92	6.4	7.98	.98
1.6	3.6	4.48	.80	4.6	6.08	.92	5.6	7.68	1.01	6.6	9.28	1.06
1.8	3.8	5.22	.87	4.8	7.02	1.00	5.8	8.82	1.10	6.8	10.62	1.17
2.0	4.0	6.00	.93	5.0	8.00	1.07	6.0	10.00	1.18	7.0	12.00	1.27
2.2	4.2	6.82	.99	5.2	9.02	1.14	6.2	11.22	1.25	7.2	13.42	1.35
2.4	4.4	7.68	1.04	5.4	10.08	1.21	6.4	12.48	1.33	7.4	14.88	1.44
2.6	4.6	8.58	1.10	5.6	11.18	1.27	6.6	13.78	1.41	7.6	16.38	1.52
2.8	4.8	9.52	1.15	5.8	12.32	1.33	6.8	15.12	1.47	7.8	17.92	1.59
3.0	5.0	10.50	1.21	6.0	13.50	1.39	7.0	16.50	1.54	8.0	19.50	1.67
3.2	5.2	11.52	1.26	6.2	14.72	1.45	7.2	17.92	1.60	8.2	21.12	1.74
3.4	5.4	12.58	1.31	6.4	15.98	1.51	7.4	19.38	1.67	8.4	22.78	1.81
3.6	5.6	13.68	1.36	6.6	17.28	1.57	7.6	20.88	1.73	8.6	24.48	1.88
3.8	5.8	14.82	1.41	6.8	18.62	1.62	7.8	22.42	1.79	8.8	26.22	1.94
4.0	6.0	16.00	1.46	7.0	20.00	1.67	8.0	24.00	1.85	9.0	28.00	2.01
4.2	6.2	17.22	1.51	7.2	21.42	1.73	8.2	25.62	1.91	9.2	29.82	2.07
4.4	6.4	18.48	1.56	7.4	22.88	1.78	8.4	27.28	1.97	9.4	31.68	2.14
4.6	6.6	19.78	1.61	7.6	24.38	1.84	8.6	28.98	2.03	9.6	33.58	2.20
4.8	6.8	21.12	1.66	7.8	25.92	1.89	8.8	30.72	2.08	9.8	35.52	2.26
5.0	7.0	22.50	1.71	8.0	27.50	1.94	9.0	32.50	2.14	10.0	37.50	2.32
5.2	7.2	23.92	1.75	8.2	29.12	1.99	9.2	34.32	2.19	10.2	39.52	2.38
5.4	7.4	25.38	1.80	8.4	30.78	2.04	9.4	36.18	2.25	10.4	41.58	2.43
5.6	7.6	26.88	1.85	8.6	32.48	2.09	9.6	38.08	2.30	10.6	43.68	2.49
5.8	7.8	28.42	1.90	8.8	34.22	2.14	9.8	40.02	2.36	10.8	45.82	2.55
6.0	8.0	30.00	1.95	9.0	36.00	2.19	10.0	42.00	2.41	11.0	48.00	2.61
6.2	8.2	31.62	1.99	9.2	37.82	2.24	10.2	44.02	2.46	11.2	50.22	2.66
6.4	8.4	33.28	2.04	9.4	39.68	2.29	10.4	46.08	2.52	11.4	52.48	2.72
6.6	8.6	34.98	2.09	9.6	41.58	2.34	10.6	48.18	2.57	11.6	54.78	2.77
6.8	8.8	36.72	2.13	9.8	43.52	2.39	10.8	50.32	2.62	11.8	57.12	2.82
7.0	.....	.....	.....	10.0	45.50	2.44	11.0	52.50	2.67	12.0	59.50	2.88
7.5	.....	.....	.....	10.5	50.62	2.56	11.5	58.12	2.80	12.5	65.62	3.01
8.0	.....	.....	.....	11.0	56.00	2.68	12.0	64.00	2.92	13.0	72.00	3.15
8.5	.....	.....	.....	11.5	61.62	2.80	12.5	70.12	3.05	13.5	78.62	3.27
9.0	.....	.....	.....	12	67.5	2.92	13.0	76.50	3.17	14.0	85.50	3.40
9.5	.....	.....	.....	.....	.....	.....	13.5	83.12	3.29	14.5	92.62	3.53
10	.....	.....	.....	.....	.....	.....	14	90.0	3.41	15	100.0	3.65
11	.....	.....	.....	.....	.....	.....	15	104.5	3.65	16	115.5	3.90

Table 15.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1—Continued.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	6.4	2.48	.36	7.4	2.88	.36	8.4	3.28	.37	9.4	3.68	.37
0.6	6.6	3.78	.52	7.6	4.38	.52	8.6	4.98	.53	9.6	5.58	.54
0.8	6.8	5.12	.66	7.8	5.92	.67	8.8	6.72	.69	9.8	7.52	.70
1.0	7.0	6.50	.79	8.0	7.50	.81	9.0	8.50	.83	10.0	9.50	.85
1.2	7.2	7.92	.91	8.2	9.12	.94	9.2	10.32	.96	10.2	11.52	.98
1.4	7.4	9.38	1.03	8.4	10.78	1.07	9.4	12.18	1.10	10.4	13.58	1.12
1.6	7.6	10.88	1.14	8.6	12.48	1.18	9.6	14.08	1.22	10.6	15.68	1.25
1.8	7.8	12.42	1.24	8.8	14.22	1.29	9.8	16.02	1.33	10.8	17.82	1.37
2.0	8.0	14.00	1.34	9.0	16.00	1.39	10.0	18.00	1.44	11.0	20.00	1.48
2.2	8.2	15.62	1.43	9.2	17.82	1.49	10.2	20.02	1.55	11.2	22.22	1.59
2.4	8.4	17.28	1.52	9.4	19.68	1.59	10.4	22.08	1.65	11.4	24.48	1.71
2.6	8.6	18.98	1.61	9.6	21.58	1.69	10.6	24.18	1.75	11.6	26.78	1.81
2.8	8.8	20.72	1.69	9.8	23.52	1.77	10.8	26.32	1.84	11.8	29.12	1.91
3.0	9.0	22.50	1.78	10.0	25.50	1.86	11.0	28.50	1.94	12.0	31.50	2.01
3.2	9.2	24.32	1.85	10.2	27.52	1.94	11.2	30.72	2.03	12.2	33.92	2.10
3.4	9.4	26.18	1.93	10.4	29.58	2.03	11.4	32.98	2.12	12.4	36.38	2.19
3.6	9.6	28.08	2.00	10.6	31.68	2.11	11.6	35.28	2.20	12.6	38.88	2.28
3.8	9.8	30.02	2.07	10.8	33.82	2.18	11.8	37.62	2.28	12.8	41.42	2.37
4.0	10.0	32.00	2.14	11.0	36.00	2.26	12.0	40.00	2.36	13.0	44.00	2.45
4.2	10.2	34.02	2.21	11.2	38.22	2.33	12.2	42.42	2.44	13.2	46.62	2.53
4.4	10.4	36.08	2.28	11.4	40.48	2.41	12.4	44.88	2.52	13.4	49.28	2.62
4.6	10.6	38.18	2.35	11.6	42.78	2.48	12.6	47.38	2.59	13.6	51.98	2.70
4.8	10.8	40.32	2.41	11.8	45.12	2.54	12.8	49.92	2.66	13.8	54.72	2.77
5.0	11.0	42.50	2.47	12.0	47.50	2.61	13.0	52.50	2.74	14.0	57.50	2.85
5.2	11.2	44.72	2.54	12.2	49.92	2.68	13.2	55.12	2.81	14.2	60.32	2.92
5.4	11.4	46.98	2.60	12.4	52.38	2.74	13.4	57.78	2.88	14.4	63.18	3.00
5.6	11.6	49.28	2.66	12.6	54.88	2.81	13.6	60.48	2.95	14.6	66.08	3.07
5.8	11.8	51.62	2.72	12.8	57.42	2.87	13.8	63.22	3.01	14.8	69.02	3.14
6.0	12.0	54.00	2.78	13.0	60.00	2.94	14.0	66.00	3.08	15.0	72.00	3.21
6.2	12.2	56.42	2.84	13.2	62.62	3.00	14.2	68.82	3.15	15.2	75.02	3.28
6.4	12.4	58.88	2.90	13.4	65.28	3.06	14.4	71.68	3.21	15.4	78.08	3.35
6.6	12.6	61.38	2.96	13.6	67.98	3.12	14.6	74.58	3.28	15.6	81.18	3.42
6.8	12.8	63.92	3.01	13.8	70.72	3.18	14.8	77.52	3.34	15.8	84.32	3.48
7.0	13.0	66.50	3.07	14.0	73.50	3.24	15.0	80.50	3.40	16.0	87.50	3.55
7.5	13.5	73.12	3.21	14.5	80.62	3.39	15.5	88.12	3.56	16.5	95.62	3.71
8.0	14.0	80.00	3.35	15.0	88.00	3.53	16.0	96.00	3.71	17.0	104.00	3.87
8.5	14.5	87.12	3.48	15.5	95.62	3.68	16.5	104.12	3.85	17.5	112.62	4.02
9.0	15.0	94.50	3.62	16.0	103.50	3.83	17.0	112.50	3.99	18.0	121.50	4.17
9.5	15.5	102.12	3.75	16.5	111.62	3.97	17.5	121.12	4.14	18.5	130.62	4.32
10	16	110.0	3.88	17	120.0	4.10	18	130.0	4.28	19	140.0	4.46
11	17	126.5	4.13	18	137.5	4.36	19	148.5	4.55	20	159.5	4.76

Table 15.—*Area in square feet, A; top width in feet, T; and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1—Continued.

Depth	Bottom width 10 feet.			Bottom width 12 feet			Bottom width 14 feet			Bottom width 16 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	11.0	10.50	.86	13.0	12.50	.88	15.0	14.50	.89	17.0	16.50	.90
1.2	11.2	12.72	1.00	13.2	15.12	1.06	15.2	17.52	1.05	17.2	19.92	1.07
1.4	11.4	14.98	1.14	13.4	17.78	1.18	15.4	20.58	1.20	17.4	23.38	1.22
1.6	11.6	17.28	1.27	13.6	20.48	1.32	15.6	23.68	1.35	17.6	26.88	1.37
1.8	11.8	19.62	1.40	13.8	23.22	1.45	15.8	26.82	1.49	17.8	30.42	1.52
2.0	12.0	22.00	1.52	14.0	26.00	1.58	16.0	30.00	1.62	18.0	34.00	1.66
2.2	12.2	24.42	1.64	14.2	28.82	1.70	16.2	33.22	1.75	18.2	37.62	1.80
2.4	12.4	26.88	1.75	14.4	31.68	1.82	16.4	36.48	1.88	18.4	41.28	1.93
2.6	12.6	29.38	1.86	14.6	34.58	1.94	16.6	39.78	2.01	18.6	44.98	2.06
2.8	12.8	31.92	1.96	14.8	37.52	2.05	16.8	43.12	2.13	18.8	48.72	2.19
3.0	13.0	34.50	2.06	15.0	40.50	2.16	17.0	46.50	2.25	19.0	52.50	2.31
3.2	13.2	37.12	2.16	15.2	43.52	2.27	17.2	49.92	2.36	19.2	56.32	2.43
3.4	13.4	39.78	2.26	15.4	46.58	2.38	17.4	53.38	2.47	19.4	60.18	2.55
3.6	13.6	42.48	2.35	15.6	49.68	2.48	17.6	56.88	2.58	19.6	64.08	2.67
3.8	13.8	45.22	2.44	15.8	52.82	2.58	17.8	60.42	2.68	19.8	68.02	2.78
4.0	14.0	48.00	2.53	16.0	56.00	2.67	18.0	64.00	2.79	20.0	72.00	2.89
4.2	14.2	50.82	2.62	16.2	59.22	2.77	18.2	67.62	2.89	20.2	76.02	2.99
4.4	14.4	53.68	2.71	16.4	62.48	2.86	18.4	71.28	2.99	20.4	80.08	3.10
4.6	14.6	56.58	2.79	16.6	65.78	2.95	18.6	74.98	3.09	20.6	84.18	3.20
4.8	14.8	59.52	2.87	16.8	69.12	3.04	18.8	78.72	3.18	20.8	88.32	3.30
5.0	15.0	62.50	2.95	17.0	72.50	3.13	19.0	82.50	3.28	21.0	92.50	3.40
5.2	15.2	65.52	3.03	17.2	75.92	3.21	19.2	86.32	3.37	21.2	96.72	3.50
5.4	15.4	68.58	3.10	17.4	79.38	3.30	19.4	90.18	3.46	21.4	100.98	3.60
5.6	15.6	71.68	3.18	17.6	82.88	3.38	19.6	94.08	3.55	21.6	105.28	3.69
5.8	15.8	74.82	3.26	17.8	86.42	3.46	19.8	98.02	3.63	21.8	109.62	3.78
6.0	16.0	78.00	3.33	18.0	90.00	3.54	20.0	102.00	3.72	22.0	114.00	3.88
6.2	16.2	81.22	3.40	18.2	93.62	3.62	20.2	106.02	3.82	22.2	118.42	3.97
6.4	16.4	84.48	3.47	18.4	97.28	3.69	20.4	110.08	3.89	22.4	122.88	4.05
6.6	16.6	87.78	3.54	18.6	100.98	3.77	20.6	114.18	3.97	22.6	127.38	4.14
6.8	16.8	91.12	3.61	18.8	104.72	3.85	20.8	118.32	4.05	22.8	131.92	4.23
7.0	17.0	94.50	3.68	19.0	108.50	3.92	21.0	122.50	4.13	23.0	136.50	4.31
7.5	17.5	103.12	3.85	19.5	118.12	4.10	21.5	133.12	4.32	23.5	148.12	4.52
8.0	18.0	112.00	4.01	20.0	128.00	4.28	22.0	144.00	4.51	24.0	160.00	4.72
8.5	18.5	121.12	4.17	20.5	138.12	4.45	22.5	155.12	4.70	24.5	172.12	4.91
9.0	19.0	130.50	4.33	21.0	148.50	4.62	23.0	166.50	4.88	25.0	184.50	5.09
9.5	19.5	140.12	4.48	21.5	159.12	4.78	23.5	178.12	5.06	25.5	197.12	5.28
10.0	20.0	150.00	4.64	22.0	170.00	4.95	24.0	190.00	5.23	26.0	210.00	5.47
10.5	20.5	160.12	4.79	22.5	181.12	5.11	24.5	202.12	5.39	26.5	223.12	5.65
11	21	170.50	4.93	23	192.5	5.26	25	214.5	5.55	27	236.5	5.82
12	22	192.0	5.21	24	216.0	5.56	26	240.0	5.88	28	264.0	6.16
13	23	214.5	5.49	25	240.5	5.86	27	266.5	6.19	29	292.5	6.49

Table 15.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1—Continued.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*
1.0	19.0	18.50	.91	21.0	20.50	.92	23.0	22.50	.93	25.0	24.50	.93
1.2	19.2	22.32	1.08	21.2	24.72	1.09	23.2	27.12	1.10	25.2	29.52	1.11
1.4	19.4	26.18	1.24	21.4	28.98	1.25	23.4	31.78	1.26	25.4	34.58	1.27
1.6	19.6	30.08	1.39	21.6	33.28	1.41	23.6	36.48	1.43	25.6	39.68	1.44
1.8	19.8	34.02	1.54	21.8	37.62	1.57	23.8	41.22	1.58	25.8	44.82	1.60
2.0	20.0	38.00	1.69	22.0	42.00	1.72	24.0	46.00	1.74	26.0	50.00	1.76
2.2	20.2	42.02	1.83	22.2	46.42	1.86	24.2	50.82	1.89	26.2	55.22	1.91
2.4	20.4	46.08	1.97	22.4	50.88	2.01	24.4	55.68	2.03	25.4	60.48	2.06
2.6	20.6	50.18	2.11	22.6	55.38	2.15	24.6	60.58	2.18	26.6	65.78	2.21
2.8	20.8	54.32	2.24	22.8	59.92	2.28	24.8	65.52	2.32	26.8	71.12	2.35
3.0	21.0	58.50	2.37	23.0	64.50	2.41	25.0	70.50	2.46	27.0	76.50	2.49
3.2	21.2	62.72	2.49	23.2	69.12	2.54	25.2	75.52	2.59	27.2	81.92	2.63
3.4	21.4	66.98	2.62	23.4	73.78	2.67	25.4	80.58	2.72	27.4	87.38	2.77
3.6	21.6	71.28	2.74	23.6	78.48	2.80	25.6	85.68	2.85	27.6	92.88	2.90
3.8	21.8	75.62	2.85	23.8	83.22	2.92	25.8	90.82	2.97	27.8	98.42	3.03
4.0	22.0	80.00	2.97	24.0	88.00	3.04	26.0	96.00	3.10	28.0	104.00	3.15
4.2	22.2	84.42	3.08	24.2	92.82	3.16	26.2	101.22	3.22	28.2	109.62	3.28
4.4	22.4	88.88	3.19	24.4	97.68	3.27	26.4	106.48	3.34	28.4	115.28	3.41
4.6	22.6	93.38	3.30	24.6	102.58	3.39	26.6	111.78	3.46	28.6	120.98	3.53
4.8	22.8	97.92	3.41	24.8	107.52	3.50	26.8	117.12	3.58	28.8	126.72	3.65
5.0	23.0	102.50	3.51	25.0	112.50	3.61	27.0	122.50	3.69	29.0	132.50	3.77
5.2	23.2	107.12	3.62	25.2	117.52	3.72	27.2	127.92	3.80	29.2	138.32	3.88
5.4	23.4	111.78	3.72	25.4	122.58	3.82	27.4	133.38	3.91	29.4	144.18	4.00
5.6	23.6	116.48	3.82	25.6	127.68	3.93	27.6	138.88	4.02	29.6	150.08	4.11
5.8	23.8	121.22	3.91	25.8	132.82	4.03	27.8	144.42	4.13	29.8	156.02	4.22
6.0	24.0	126.00	4.01	26.0	138.00	4.13	28.0	150.00	4.23	30.0	162.00	4.33
6.2	24.2	130.82	4.11	26.2	143.22	4.23	28.2	155.62	4.34	30.2	168.02	4.44
6.4	24.4	135.68	4.20	26.4	148.48	4.33	28.4	161.28	4.44	30.4	174.08	4.54
6.6	24.6	140.58	4.29	26.6	153.78	4.43	28.6	166.98	4.54	30.6	180.18	4.65
6.8	24.8	145.52	4.38	26.8	159.12	4.52	28.8	172.72	4.64	30.8	186.32	4.76
7.0	25.0	150.50	4.47	27.0	164.50	4.61	29.0	178.50	4.74	31.0	192.50	4.86
7.5	25.5	163.12	4.69	27.5	178.12	4.84	29.5	193.12	4.98	31.5	208.12	5.11
8.0	26.0	176.00	4.90	28.0	192.00	5.07	30.0	208.00	5.21	32.0	224.00	5.35
8.5	26.5	189.12	5.11	28.5	206.12	5.29	30.5	223.12	5.44	32.5	240.12	5.58
9.0	27.0	202.50	5.31	29.0	220.50	5.50	31.0	238.50	5.66	33.0	256.50	5.81
9.5	27.5	216.12	5.51	29.5	235.12	5.70	31.5	254.12	5.88	33.5	273.12	6.04
10.0	28.0	230.00	5.70	30.0	250.00	5.90	32.0	270.00	6.09	34.0	290.00	6.26
10.5	28.5	244.12	5.88	30.5	265.12	6.09	32.5	286.12	6.29	34.5	307.12	6.47
11	29	258.5	6.06	31	280.5	6.28	33	302.5	6.49	35	324.5	6.68
12	30	288.0	6.42	32	312.0	6.66	34	336.0	6.88	36	360.0	7.08
13	31	318.5	6.76	33	344.5	7.02	35	370.5	7.26	37	396.5	7.47

Table 15.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1—Continued.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*	*T*	*A*	area ÷ wet per. = *r*
1.0	27.0	26.50	.94	29.0	28.50	.95	31.0	30.50	.95	33.0	32.50	.95
1.2	27.2	31.92	1.11	29.2	34.32	1.12	31.2	36.72	1.12	33.2	39.12	1.13
1.4	27.4	37.38	1.28	29.4	40.18	1.29	31.4	42.98	1.30	33.4	45.78	1.30
1.6	27.6	42.88	1.45	29.6	46.08	1.46	31.6	49.28	1.47	33.6	52.48	1.47
1.8	27.8	48.42	1.61	29.8	52.02	1.62	31.8	55.62	1.63	33.8	59.22	1.64
2.0	28.0	54.00	1.77	30.0	58.00	1.79	32.0	62.00	1.80	34.0	66.00	1.81
2.2	28.2	59.62	1.93	30.2	64.02	1.94	32.2	68.42	1.96	34.2	72.82	1.97
2.4	28.4	65.28	2.08	30.4	70.08	2.10	32.4	74.88	2.12	34.4	79.68	2.13
2.6	28.6	70.98	2.23	30.6	76.18	2.25	32.6	81.38	2.27	34.6	86.58	2.29
2.8	28.8	76.72	2.38	30.8	82.32	2.40	32.8	87.92	2.42	34.8	93.52	2.44
3.0	29.0	82.50	2.52	31.0	88.50	2.55	33.0	94.50	2.57	35.0	100.50	2.60
3.2	29.2	88.32	2.67	31.2	94.72	2.69	33.2	101.12	2.72	35.2	107.52	2.75
3.4	29.4	94.18	2.80	31.4	100.98	2.84	33.4	107.78	2.87	35.4	114.58	2.90
3.6	29.6	100.08	2.96	31.6	107.28	2.98	33.6	114.48	3.01	35.6	121.68	3.04
3.8	29.8	106.02	3.07	31.8	113.62	3.11	33.8	121.22	3.15	35.8	128.82	3.18
4.0	30.0	112.00	3.21	32.0	120.00	3.25	34.0	128.00	3.29	36.0	136.00	3.32
4.2	30.2	118.02	3.34	32.2	126.42	3.38	34.2	134.82	3.42	36.2	143.22	3.46
4.4	30.4	124.08	3.46	32.4	132.88	3.51	34.4	141.68	3.56	36.4	150.48	3.60
4.6	30.6	130.18	3.59	32.6	139.38	3.64	34.6	148.58	3.69	36.6	157.78	3.73
4.8	30.8	136.32	3.71	32.8	145.92	3.77	34.8	155.52	3.82	36.8	165.12	3.86
5.0	31.0	142.50	3.84	33.0	152.50	3.89	35.0	162.50	3.95	37.0	172.50	3.99
5.2	31.2	148.72	3.95	33.2	159.12	4.01	35.2	169.52	4.07	37.2	179.92	4.12
5.4	31.4	154.98	4.07	33.4	165.78	4.14	35.4	176.58	4.20	37.4	187.58	4.26
5.6	31.6	161.28	4.19	33.6	172.48	4.26	35.6	183.68	4.32	37.6	194.88	4.38
5.8	31.8	167.62	4.30	33.8	179.22	4.37	35.8	190.82	4.44	37.8	202.42	4.50
6.0	32.0	174.00	4.41	34.0	186.00	4.49	36.0	198.00	4.56	38.0	210.00	4.62
6.2	32.2	180.42	4.53	34.2	192.82	4.61	36.2	205.22	4.68	38.2	217.62	4.74
6.4	32.4	186.88	4.64	34.4	199.68	4.72	36.4	212.48	4.80	38.4	225.28	4.86
6.6	32.6	193.38	4.74	34.6	206.58	4.83	36.6	219.78	4.91	38.6	232.98	4.98
6.8	32.8	199.92	4.85	34.8	213.52	4.94	36.8	227.12	5.03	38.8	240.72	5.10
7.0	33.0	206.50	4.96	35.0	220.50	5.05	37.0	234.50	5.14	39.0	248.50	5.22
7.5	33.5	223.12	5.22	35.5	238.12	5.32	37.5	253.12	5.41	39.5	268.12	5.50
8.0	34.0	240.00	5.47	36.0	256.00	5.58	38.0	272.00	5.68	40.0	288.00	5.77
8.5	34.5	257.12	5.71	36.5	274.12	5.83	38.5	291.12	5.94	40.5	308.12	6.04
9.0	35.0	274.50	5.95	37.0	292.50	6.08	39.0	310.50	6.20	41.0	328.50	6.30
9.5	35.5	292.12	6.18	37.5	311.12	6.32	39.5	330.12	6.44	41.5	349.12	6.56
10.0	36.0	310.00	6.41	38.0	330.00	6.55	40.0	350.00	6.68	42.0	370.00	6.81
10.5	36.5	328.12	6.63	38.5	349.12	6.78	40.5	370.12	6.92	42.5	391.12	7.05
11	37	346.5	6.85	39	368.5	7.01	41	390.5	7.15	43	412.5	7.29
12	38	384.0	7.27	40	408.0	7.44	42	432.0	7.60	44	456.0	7.75
13	39	422.5	7.67	41	448.5	7.86	43	474.5	8.03	45	500.5	8.20

Table 15.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes ½ to 1—Continued.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	36.0	35.50	.95	41.0	40.50	.96	46.0	45.50	.96	51.0	50.50	.97
1.2	36.2	42.72	1.13	41.2	48.72	1.14	46.2	54.72	1.15	51.2	60.72	1.15
1.4	36.4	49.98	1.31	41.4	56.98	1.32	46.4	63.98	1.33	51.4	70.98	1.34
1.6	36.6	57.28	1.49	41.6	65.28	1.50	46.6	73.28	1.51	51.6	81.28	1.52
1.8	36.8	64.62	1.66	41.8	73.62	1.67	46.8	82.62	1.68	51.8	91.62	1.70
2.0	37.0	72.00	1.82	42.0	82.00	1.84	47.0	92.00	1.86	52.0	102.00	1.87
2.2	37.2	79.42	1.99	42.2	90.42	2.01	47.2	101.42	2.03	52.2	112.42	2.05
2.4	37.4	86.88	2.15	42.4	98.88	2.18	47.4	110.88	2.20	52.4	122.88	2.22
2.6	37.6	94.38	2.31	42.6	107.38	2.34	47.6	120.38	2.37	52.6	133.38	2.39
2.8	37.8	101.92	2.47	42.8	115.92	2.51	47.8	129.92	2.53	52.8	143.92	2.56
3.0	38.0	109.50	2.63	43.0	124.50	2.67	48.0	139.50	2.70	53.0	154.50	2.72
3.2	38.2	117.12	2.78	43.2	133.12	2.82	48.2	149.12	2.86	53.2	165.12	2.89
3.4	38.4	124.78	2.93	43.4	141.78	2.98	48.4	158.78	3.02	53.4	175.78	3.05
3.6	38.6	132.48	3.08	43.6	150.48	3.13	48.6	168.48	3.18	53.6	186.48	3.21
3.8	38.8	140.22	3.22	43.8	159.22	3.28	48.8	178.22	3.33	53.8	197.22	3.37
4.0	39.0	148.00	3.37	44.0	168.00	3.43	49.0	188.00	3.49	54.0	208.00	3.56
4.2	39.2	155.82	3.51	44.2	176.82	3.58	49.2	197.82	3.64	54.2	218.82	3.68
4.4	39.4	163.68	3.65	44.4	185.68	3.73	49.4	207.68	3.79	54.4	229.68	3.84
4.6	39.6	171.58	3.79	44.6	194.58	3.87	49.6	217.58	3.94	54.6	240.58	3.99
4.8	39.8	179.52	3.93	44.8	203.52	4.01	49.8	227.52	4.08	54.8	251.52	4.14
5.0	40.0	187.50	4.06	45.0	212.50	4.15	50.0	237.50	4.23	55.0	262.50	4.29
5.2	40.2	195.52	4.19	45.2	221.52	4.29	50.2	247.52	4.37	55.2	273.52	4.44
5.4	40.4	203.58	4.32	45.4	230.58	4.43	50.4	257.58	4.51	55.4	284.58	4.58
5.6	40.6	211.68	4.45	45.6	239.68	4.56	50.6	267.68	4.65	55.6	295.68	4.73
5.8	40.8	219.82	4.58	45.8	248.82	4.70	50.8	277.82	4.79	55.8	306.82	4.87
6.0	41.0	228.00	4.71	46.0	258.00	4.83	51.0	288.00	4.93	56.0	318.00	5.01
6.2	41.2	236.22	4.84	46.2	267.22	4.96	51.2	298.22	5.07	56.2	329.22	5.16
6.4	41.4	244.48	4.96	46.4	276.48	5.09	51.4	308.48	5.20	56.4	340.48	5.30
6.6	41.6	252.78	5.08	46.6	285.78	5.22	51.6	318.78	5.34	56.6	351.78	5.43
6.8	41.8	261.12	5.20	46.8	295.12	5.35	51.8	329.12	5.47	56.8	363.12	5.57
7.0	42.0	269.50	5.32	47.0	304.50	5.47	52.0	339.50	5.60	57.0	374.50	5.70
7.5	42.5	290.62	5.61	47.5	328.12	5.78	52.5	365.62	5.92	57.5	403.12	6.04
8.0	43.0	312.00	5.90	48.0	352.00	6.08	53.0	392.00	6.23	58.0	432.00	6.36
8.5	43.5	333.62	6.18	48.5	376.12	6.37	53.5	418.62	6.54	58.5	461.12	6.68
9.0	44.0	355.50	6.45	49.0	400.50	6.66	54.0	445.50	6.84	59.0	490.50	7.00
9.5	44.5	377.62	6.71	49.5	425.12	6.94	54.5	472.62	7.13	59.5	520.12	7.30
10.0	45.0	400.00	6.97	50.0	450.00	7.22	55.0	500.00	7.42	60.0	550.00	7.60
10.5	45.5	422.62	7.22	50.5	475.12	7.49	55.5	527.62	7.70	60.5	580.12	7.89
11	46	445.5	7.47	51	500.5	7.75	56	555.5	7.98	61	610.5	8.18
12	47	492.0	7.96	52	552.0	8.26	57	612.0	8.52	62	672.0	8.76
13	48	539.5	8.42	53	604.5	8.75	58	669.5	9.03	63	784.5	9.29

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1 to 1.

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	2.8	.96	.31	3.8	1.36	.33	4.8	1.76	.34	5.8	2.16	.35
0.6	3.2	1.56	.42	4.2	2.16	.46	5.2	2.76	.48	6.2	3.36	.50
0.8	3.6	2.24	.53	4.6	3.04	.58	5.6	3.84	.61	6.6	4.64	.64
1.0	4.0	3.00	.62	5.0	4.00	.69	6.0	5.00	.78	7.0	6.00	.77
1.2	4.4	3.84	.71	5.4	5.04	.79	6.4	6.24	.84	7.4	7.44	.89
1.4	4.8	4.76	.80	5.8	6.16	.89	6.8	7.56	.95	7.8	8.96	1.00
1.6	5.2	5.76	.88	6.2	7.36	.98	7.2	8.96	1.05	8.2	10.56	1.11
1.8	5.6	6.84	.96	6.6	8.64	1.07	7.6	10.44	1.15	8.6	12.24	1.21
2.0	6.0	8.00	1.04	7.0	10.00	1.16	8.0	12.00	1.24	9.0	14.00	1.31
2.2	6.4	9.24	1.12	7.4	11.44	1.24	8.4	13.64	1.33	9.4	15.84	1.41
2.4	6.8	10.56	1.20	7.8	12.96	1.33	8.8	15.36	1.42	9.8	17.76	1.51
2.6	7.2	11.96	1.28	8.2	14.56	1.41	9.2	17.16	1.51	10.2	19.76	1.60
2.8	7.6	13.44	1.36	8.6	16.24	1.49	9.6	19.04	1.60	10.6	21.84	1.69
3.0	8.0	15.00	1.43	9.0	18.00	1.57	10.0	21.00	1.68	11.0	24.00	1.78
3.2	8.4	16.64	1.51	9.4	19.84	1.65	10.4	23.04	1.77	11.4	26.24	1.87
3.4	8.8	18.36	1.59	9.8	21.76	1.72	10.8	25.16	1.85	11.8	28.56	1.96
3.6	9.2	20.16	1.66	10.2	23.76	1.80	11.2	27.36	1.93	12.2	30.96	2.04
3.8	9.6	22.04	1.73	10.6	25.84	1.88	11.6	29.64	2.01	12.6	33.44	2.13
4.0	10.0	24.00	1.80	11.0	28.00	1 96	12 0	32.00	2.09	13.0	36.00	2.21
4.2	10.4	26.04	1.88	11.4	30.24	2 03	12.4	34.44	2.17	13.4	38.64	2.29
4.4	10.8	28.16	1.95	11.8	32.56	2 11	12.8	36.96	2.25	13.8	41.36	2.37
4.6	11.2	30.36	2.02	12.2	34.96	2.18	13.2	39.56	2.33	14.2	44.16	2.45
4.8	11.6	32.64	2.10	12.6	37.44	2.26	13.6	42.24	2.41	14.6	47.04	2.53
5.0	12.0	35.00	2.17	13.0	40.00	2.33	14.0	45.00	2.48	15.0	50.00	2.61
5.2	12.4	37.44	2.24	13.4	42.64	2.41	14.4	47.84	2.56	15.4	53.04	2.69
5.4	12.8	39.96	2.31	13.8	45.36	2.48	14.8	50.76	2.63	15.8	56.16	2.77
5.6	13.2	42.56	2.38	14.2	48.16	2.55	15.2	53.76	2.71	16.2	59.36	2.85
5.8	13.6	45.24	2.46	14.6	51.04	2.63	15.6	56.84	2.79	16.6	62.64	2 93
6.0	14.0	48.00	2.53	15.0	54.00	2.70	16.0	60.00	2.86	17.0	66.00	3.00
6.2	14.4	50.84	2.60	15.4	57.04	2.78	16.4	63.24	2.94	17.4	69.44	3.08
6.4	14.8	53.76	2.67	15.8	60.16	2.85	16.8	66.56	3.01	17.8	72.96	3.16
6.6	15.2	56.76	2.75	16.2	63.36	2.92	17.2	69.96	3.09	18.2	76.56	3.23
6.8	15.6	59.84	2.82	16.6	66.64	3.00	17.6	73.44	3.16	18.6	80.24	3.31
7.0	.....	.....	.....	17	70.00	3.07	18	77.00	3.24	19	84.00	3.39
7.5	.....	.....	.....	18	78.75	3.25	19	86.25	3.43	20	93.75	3.58
8.0	.....	.....	.....	19	88.00	3.43	20	96.00	3.61	21	104.00	3.77
8.5	.....	.....	.....	20	97.75	3.62	21	106.25	3.79	22	114.75	3.96
9.0	.....	.....	.....	21	108.00	3.80	22	117.00	3.97	23	126.00	4.14
9.5	.....	.....	.....	.....	.....	.....	23	128.25	4.16	24	137.75	4.33
10	.....	.....	.....	.....	.....	.....	24	140.00	4.34	25	150.00	4.51
11	.....	.....	.....	.....	.....	.....	26	165.00	4.70	27	176.00	4.87

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **side slopes 1 to 1**—Continued.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	A	area / wet per. = r	T	A	area / wet per. = r	T	A	area / wet per. = r	T	A	area / wet per. = r
0.4	6.8	2.56	.36	7.8	2.96	.36	8.8	3.36	.37	9.8	3.76	.37
0.6	7.2	3.96	.51	8.2	4.56	.52	9.2	5.16	.53	10.2	5.76	.54
0.8	7.6	5.44	.66	8.6	6.24	.67	9.6	7.04	.69	10.6	7.84	.70
1.0	8.0	7.00	.79	9.0	8.00	.81	10.0	9.00	.83	11.0	10.00	.85
1.2	8.4	8.64	.91	9.4	9.84	.95	10.4	11.04	.97	11.4	12.24	.99
1.4	8.8	10.36	1.06	9.8	11.76	1.07	10.8	13.16	1.10	11.8	14.56	1.12
1.6	9.2	12.16	1.15	10.2	13.76	1.19	11.2	15.36	1.23	12.2	16.96	1.25
1.8	9.6	14.04	1.26	10.6	15.84	1.31	11.6	17.64	1.35	12.6	19.44	1.38
2.0	10.0	16.00	1.37	11.0	18.00	1.42	12.0	20.00	1.46	13.0	22.00	1.50
2.2	10.4	18.04	1.48	11.4	20.24	1.53	12.4	22.44	1.58	13.4	24.64	1.62
2.4	10.8	20.16	1.58	11.8	22.56	1.64	12.8	24.96	1.69	13.8	27.36	1.73
2.6	11.2	22.36	1.67	12.2	24.96	1.74	13.2	27.56	1.80	14.2	30.16	1.84
2.8	11.6	24.64	1.77	12.6	27.44	1.84	13.6	30.24	1.90	14.6	33.04	1.95
3.0	12.0	27.00	1.86	13.0	30.00	1.94	14.0	33.00	2.00	15.0	36.00	2.06
3.2	12.4	29.44	1.96	13.4	32.64	2.03	14.4	35.84	2.10	15.4	39.04	2.16
3.4	12.8	31.96	2.05	13.8	35.36	2.13	14.8	38.76	2.20	15.8	42.16	2.26
3.6	13.2	34.56	2.14	14.2	38.16	2.22	15.2	41.76	2.30	16.2	45.36	2.36
3.8	13.6	37.24	2.23	14.6	41.04	2.31	15.6	44.84	2.40	16.6	48.64	2.46
4.0	14.0	40.00	2.31	15.0	44.00	2.40	16.0	48.00	2.49	17.0	52.00	2.56
4.2	14.4	42.84	2.40	15.4	47.04	2.49	16.4	51.24	2.58	17.4	55.44	2.66
4.4	14.8	45.76	2.48	15.8	50.16	2.58	16.8	54.56	2.67	17.8	58.96	2.76
4.6	15.2	48.76	2.56	16.2	53.36	2.67	17.2	57.96	2.76	18.2	62.56	2.84
4.8	15.6	51.84	2.65	16.6	56.64	2.76	17.6	61.44	2.85	18.6	66.24	2.93
5.0	16.0	55.00	2.73	17.0	60.00	2.84	18.0	65.00	2.94	19.0	70.00	3.02
5.2	16.4	58.24	2.81	17.4	63.44	2.92	18.4	68.64	3.02	19.4	73.84	3.10
5.4	16.8	61.56	2.89	17.8	66.96	3.01	18.8	72.36	3.11	19.8	77.76	3.20
5.6	17.2	64.96	2.97	18.2	70.56	3.09	19.2	76.16	3.19	20.2	81.76	3.29
5.8	17.6	68.44	3.05	18.6	74.24	3.17	19.6	80.04	3.28	20.6	85.84	3.38
6.0	18.0	72.00	3.13	19.0	78.00	3.25	20.0	84.00	3.36	21.0	90.00	3.47
6.2	18.4	75.64	3.21	19.4	81.84	3.34	20.4	88.04	3.45	21.4	94.24	3.55
6.4	18.8	79.36	3.29	19.8	85.76	3.42	20.8	92.16	3.53	21.8	98.56	3.64
6.6	19.2	83.16	3.37	20.2	89.76	3.50	21.2	96.36	3.61	22.2	102.96	3.72
6.8	19.6	87.04	3.45	20.6	93.84	3.58	21.6	100.64	3.70	22.6	107.44	3.80
7.0	20	91.00	3.56	21	98.00	3.66	22	105.00	3.78	23	112.00	3.89
7.5	21	101.25	3.72	22	108.75	3.86	23	116.25	3.98	24	123.75	4.10
8.0	22	112.00	3.91	23	120.00	4.05	24	128.00	4.18	25	136.00	4.30
8.5	23	123.25	4.10	24	131.75	4.25	25	140.25	4.38	26	148.75	4.50
9.0	24	135.00	4.29	25	144.00	4.44	26	153.00	4.57	27	162.00	4.70
9.5	25	147.25	4.48	26	156.75	4.63	27	166.25	4.77	28	175.75	4.90
10.0	26	160.00	4.67	27	170.00	4.82	28	180.00	4.96	29	190.00	5.10
11	28	187.00	5.04	29	198.00	5.20	30	209.00	5.34	31	220.00	5.48

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1 to 1—Continued.

Depth	Bottom width 10 feet.			Bottom width 12 feet			Bottom width 14 feet.			Bottom width 16 feet.		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	12.0	11.00	.86	14.0	13.00	.88	16.0	15.00	.89	18.0	17.00	.90
1.2	12.4	13.44	1.01	14.4	15.84	1.08	16.4	18.24	1.05	18.4	20.64	1.06
1.4	12.8	15.96	1.15	14.8	18.76	1.18	16.8	21.56	1.20	18.8	24.36	1.22
1.6	13.2	18.56	1.28	15.2	21.76	1.32	17.2	24.96	1.35	19.2	28.16	1.37
1.8	13.6	21.24	1.41	15.6	24.84	1.46	17.6	28.44	1.49	19.6	32.04	1.52
2.0	14.0	24.00	1.53	16.0	28.00	1.59	18.0	32.00	1.63	20.0	36.00	1.66
2.2	14.4	26.84	1.65	16.4	31.24	1.71	18.4	35.64	1.76	20.4	40.04	1.80
2.4	14.8	29.76	1.77	16.8	34.56	1.84	18.8	39.36	1.89	20.8	44.16	1.94
2.6	15.2	32.76	1.89	17.2	37.96	1.96	19.2	43.16	2.02	21.2	48.36	2.07
2.8	15.6	35.84	2.00	17.6	41.44	2.08	19.6	47.04	2.15	21.6	52.64	2.20
3.0	16.0	39.00	2.11	18.0	45.00	2.20	20.0	51.00	2.27	22.0	57.00	2.33
3.2	16.4	42.24	2.22	18.4	48.64	2.31	20.4	55.04	2.39	22.4	61.44	2.45
3.4	16.8	45.56	2.33	18.8	52.36	2.42	20.8	59.16	2.51	22.8	65.96	2.58
3.6	17.2	48.96	2.43	19.2	56.16	2.53	21.2	63.36	2.62	23.2	70.56	2.70
3.8	17.6	52.44	2.53	19.6	60.04	2.64	21.6	67.64	2.73	23.6	75.24	2.82
4.0	18.0	56.00	2.63	20.0	64.00	2.74	22.0	72.00	2.84	24.0	80.00	2.96
4.2	18.4	59.64	2.73	20.4	68.04	2.85	22.4	76.44	2.95	24.4	84.84	3.04
4.4	18.8	63.36	2.83	20.8	72.16	2.95	22.8	80.96	3.06	24.8	89.76	3.16
4.6	19.2	67.16	2.92	21.2	76.36	3.05	23.2	85.56	3.17	25.2	94.76	3.27
4.8	19.6	71.04	3.02	21.6	80.64	3.15	23.6	90.24	3.28	25.6	99.84	3.38
5.0	20.0	75.00	3.11	22.0	85.00	3.25	24.0	95.00	3.38	26.0	105.00	3.48
5.2	20.4	79.04	3.20	22.4	89.44	3.35	24.4	99.84	3.48	26.4	110.24	3.59
5.4	20.8	83.16	3.29	22.8	93.96	3.44	24.8	104.76	3.58	26.8	115.56	3.69
5.6	21.2	87.36	3.38	23.2	98.56	3.54	25.2	109.76	3.68	27.2	120.96	3.80
5.8	21.6	91.64	3.47	23.6	103.24	3.63	25.6	114.84	3.78	27.6	126.44	3.90
6.0	22.0	96.00	3.56	24.0	108.00	3.73	26.0	120.00	3.88	28.0	132.00	4.00
6.2	22.4	100.44	3.65	24.4	112.84	3.82	26.4	125.24	3.97	28.4	137.64	4.10
6.4	22.8	104.96	3.73	24.8	117.76	3.91	26.8	130.56	4.07	28.8	143.36	4.20
6.6	23.2	109.56	3.82	25.2	122.76	4.00	27.2	135.96	4.16	29.2	149.16	4.30
6.8	23.6	114.24	3.91	25.6	127.84	4.09	27.6	141.44	4.26	29.6	155.04	4.40
7.0	24.0	119.00	3.99	26.0	133.00	4.18	28.0	147.00	4.35	30.0	161.00	4.50
7.5	25.0	131.25	4.21	27.0	146.25	4.40	29.0	161.25	4.58	31.0	176.25	4.74
8.0	26.0	144.00	4.42	28.0	160.00	4.62	30.0	176.00	4.81	32.0	192.00	4.97
8.5	27.0	157.25	4.62	29.0	174.25	4.84	31.0	191.25	5.06	33.0	208.25	5.20
9.0	28.0	171.00	4.82	30.0	189.00	5.05	32.0	207.00	5.25	34.0	225.00	5.43
9.5	29.0	185.25	5.02	31.0	204.25	5.26	33.0	223.25	5.47	35.0	278.25	5.65
10.0	30.0	200.00	5.22	32.0	220.00	5.46	34.0	240.00	5.68	36.0	260.00	5.87
10.5	31.0	215.25	5.42	33.0	236.25	5.67	35.0	257.25	5.89	37.0	278.25	6.09
11	32.0	231.00	5.62	34.0	253.00	5.87	36.0	275.00	6.10	38.0	297.00	6.31
12	34.0	264.00	6.01	36.0	288.00	6.27	38.0	312.00	6.51	40.0	336.00	6.73
13	36.0	299.00	6.39	38.0	325.00	6.66	40.0	351.00	6.92	42.0	377.00	7.15

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1 to 1—Continued.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	20.0	19.00	.91	22.0	21.00	.92	24.0	23.00	.93	26.0	25.00	.93
1.2	20.4	25.04	1.08	22.4	25.44	1.09	24.4	27.84	1.10	26.4	30.24	1.10
1.4	20.8	27.16	1.24	22.8	29.96	1.25	24.8	32.76	1.26	26.8	35.56	1.27
1.6	21.2	31.36	1.39	23.2	34.56	1.41	25.2	37.76	1.42	27.2	40.96	1.44
1.8	21.6	35.64	1.54	23.6	39.24	1.56	25.6	42.84	1.58	27.6	46.44	1.60
2.0	22.0	40.00	1.69	24.0	44.00	1.72	26.0	48.00	1.74	28.0	52.00	1.75
2.2	22.4	44.44	1.83	24.4	48.84	1.86	26.4	53.24	1.89	28.4	57.64	1.91
2.4	22.8	48.96	1.98	24.8	53.76	2.01	26.8	58.56	2.03	28.8	63.36	2.06
2.6	23.2	53.56	2.11	25.2	58.76	2.15	27.2	63.96	2.18	29.2	69.16	2.20
2.8	23.6	58.24	2.25	25.6	63.84	2.29	27.6	69.44	2.32	29.6	75.04	2.35
3.0	24.0	63.00	2.38	26.0	69.00	2.42	28.0	75.00	2.45	30.0	81.00	2.49
3.2	24.4	67.84	2.51	26.4	74.24	2.56	28.4	80.64	2.60	30.4	87.04	2.63
3.4	24.8	72.76	2.63	26.8	79.56	2.69	28.8	86.36	2.73	30.8	93.16	2.77
3.6	25.2	77.76	2.76	27.2	84.96	2.82	29.2	92.16	2.86	31.2	99.36	2.91
3.8	25.6	82.84	2.88	27.6	90.44	2.95	29.6	98.04	2.99	31.6	105.64	3.04
4.0	26.0	88.00	3.00	28.0	96.00	3.07	30.0	104.00	3.12	32.0	112.00	3.17
4.2	26.4	93.24	3.12	28.4	101.64	3.19	30.4	110.04	3.25	32.4	118.44	3.30
4.4	26.8	98.56	3.24	28.8	107.36	3.31	30.8	116.16	3.37	32.8	124.96	3.43
4.6	27.2	103.96	3.35	29.2	113.16	3.43	31.2	122.36	3.49	33.2	131.56	3.55
4.8	27.6	109.44	3.47	29.6	119.04	3.55	31.6	128.64	3.62	33.6	138.24	3.68
5.0	28.0	115.00	3.58	30.0	125.00	3.66	32.0	135.00	3.73	34.0	145.00	3.80
5.2	28.4	120.64	3.69	30.4	131.04	3.78	32.4	141.44	3.85	34.4	151.84	3.92
5.4	28.8	126.36	3.80	30.8	137.16	3.89	32.8	147.96	3.97	34.8	158.76	4.04
5.6	29.2	132.16	3.90	31.2	143.36	4.00	33.2	154.56	4.08	35.2	165.76	4.16
5.8	29.6	138.04	4.01	31.6	149.64	4.11	33.6	161.24	4.20	35.6	172.84	4.28
6.0	30.0	144.00	4.12	32.0	156.00	4.22	34.0	168.00	4.31	36.0	180.00	4.39
6.2	30.4	150.04	4.22	32.4	162.44	4.33	34.4	174.84	4.42	36.4	187.24	4.51
6.4	30.8	156.16	4.33	32.8	168.96	4.44	34.8	181.76	4.53	36.8	194.56	4.62
6.6	31.2	162.36	4.43	33.2	175.56	4.54	35.2	188.76	4.64	37.2	201.96	4.73
6.8	31.6	168.64	4.53	33.6	182.24	4.64	35.6	195.84	4.75	37.6	209.44	4.84
7.0	32	175.00	4.63	34	189.00	4.75	36	203.00	4.86	38	217.00	4.95
7.5	33	191.25	4.88	35	206.25	5.01	37	221.25	5.12	39	236.25	5.23
8.0	34	208.00	5.12	36	224.00	5.26	38	240.00	5.38	40	256.00	5.49
8.5	35	225.25	5.36	37	242.25	5.50	39	259.25	5.64	41	276.25	5.75
9.0	36	243.00	5.59	38	261.00	5.74	40	279.00	5.88	42	297.00	6.01
9.5	37	261.25	5.82	39	280.25	5.98	41	299.25	6.12	43	318.25	6.26
10.0	38	280.00	6.05	40	300.00	6.21	42	320.00	6.35	44	340.00	6.50
10.5	39	299.25	6.28	41	320.25	6.44	43	341.25	6.60	45	363.25	6.75
11	40	319	6.50	42	341	6.67	44	363	4.84	46	385	6.99
12	42	360	6 93	44	384	7.12	46	408	7.30	48	432	7.46
13	44	408	7.36	46	429	7.56	48	456	7.74	50	481	7.91

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1 to 1—Continued.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	A	$\frac{\text{area}}{\text{wet per.}}$	T	A	$\frac{\text{area}}{\text{wet per.}}$	T	A	$\frac{\text{area}}{\text{wet per.}}$	T	A	$\frac{\text{area}}{\text{wet per.}}$
1.0	28.0	27.00	.94	30.0	29.00	.94	32.0	31.00	.94	34.0	33.00	.95
1.2	28.4	32.64	1.11	30.4	35.04	1.12	32.4	37.44	1.12	34.4	39.84	1.13
1.4	28.8	38.36	1.28	30.8	41.16	1.29	32.8	43.96	1.29	34.8	46.76	1.30
1.6	29.2	44.16	1.45	31.2	47.36	1.46	33.2	50.56	1.46	35.2	53.76	1.47
1.8	29.6	50.04	1.61	31.6	53.64	1.62	33.6	57.24	1.63	35.6	60.84	1.64
2.0	30.0	56.00	1.77	32.0	60.00	1.78	34.0	64.00	1.80	36.0	68.00	1.81
2.2	30.4	62.04	1.93	32.4	66.44	1.94	34.4	70.84	1.96	36.4	75.24	1.97
2.4	30.8	68.16	2.08	32.8	72.96	2.10	34.8	77.76	2.11	36.8	82.56	2.13
2.6	31.2	74.36	2.23	33.2	79.56	2.25	35.2	84.76	2.27	37.2	89.96	2.29
2.8	31.6	80.64	2.38	33.6	86.24	2.40	35.6	91.84	2.42	37.6	97.44	2.44
3.0	32.0	87.00	2.52	34.0	93.00	2.55	36.0	99.00	2.57	38.0	105.00	2.59
3.2	32.4	93.44	2.67	34.4	99.84	2.69	36.4	106.24	2.72	38.4	112.64	2.74
3.4	32.8	99.96	2.81	34.8	106.76	2.84	36.8	113.56	2.87	38.8	120.36	2.89
3.6	33.2	106.56	2.95	35.2	113.76	2.98	37.2	120.96	3.01	39.2	127.96	3.03
3.8	33.6	113.24	3.08	35.6	120.84	3.12	37.6	128.44	3.15	39.6	136.04	3.18
4.0	34.0	120.00	3.22	36.0	128.00	3.26	38.0	136.00	3.29	40.0	144.00	3.32
4.2	34.4	126.84	3.35	36.4	135.24	3.39	38.4	143.64	3.43	40.4	152.04	3.46
4.4	34.8	133.76	3.48	36.8	142.56	3.53	38.8	151.36	3.57	40.8	160.16	3.60
4.6	35.2	140.76	3.61	37.2	149.96	3.66	39.2	159.16	3.70	41.2	168.36	3.74
4.8	35.6	147.84	3.74	37.6	157.44	3.79	39.6	167.04	3.83	41.6	176.64	3.88
5.0	36.0	155.00	3.86	38.0	165.00	3.91	40.0	175.00	3.97	42.0	185.00	4.01
5.2	36.4	162.24	3.99	38.4	172.64	4.04	40.4	183.04	4.09	42.4	193.44	4.14
5.4	36.8	169.56	4.11	38.8	180.36	4.17	40.8	191.16	4.22	42.8	201.96	4.27
5.6	37.2	176.96	4.23	39.2	188.16	4.29	41.2	199.36	4.35	43.2	210.56	4.40
5.8	37.6	184.44	4.35	39.6	196.04	4.41	41.6	207.64	4.47	43.6	219.24	4.53
6.0	38.0	192.00	4.47	40.0	204.00	4.54	42.0	216.00	4.60	44.0	228.00	4.66
6.2	38.4	199.64	4.59	40.4	212.04	4.66	42.4	224.44	4.72	44.4	236.84	4.78
6.4	38.8	207.36	4.70	40.8	220.16	4.78	42.8	232.96	4.84	44.8	245.76	4.90
6.6	39.2	215.16	4.82	41.2	228.36	4.89	43.2	241.56	4.96	45.2	254.76	5.03
6.8	39.6	223.04	4.93	41.6	236.64	5.01	43.6	250.24	5.08	45.6	263.84	5.15
7.0	40	231.00	5.04	42	245.00	5.10	44	259.00	5.20	46	273.00	5.27
7.5	41	251.25	5.32	43	266.25	5.41	45	281.25	5.49	47	296.25	5.57
8.0	42	272.00	5.59	44	288.00	5.69	46	304.00	5.78	48	320.00	5.86
8.5	43	293.25	5.86	45	310.25	5.96	47	327.25	6.06	49	344.25	6.14
9.0	44	315.00	6.12	46	333.00	6.23	48	351.00	6.33	50	369.00	6.42
9.5	45	337.25	6.38	47	356.25	6.49	49	375.25	6.60	51	394.25	6.70
10.0	46	360.00	6.63	48	380.00	6.75	50	400.00	6.86	52	420.00	6.97
10.5	47	383.25	6.88	49	404.25	7.00	51	425.25	7.12	53	446.25	7.23
11	48	407	7.13	50	429	7.26	52	451	7.38	54	473	7.49
12	50	456	7.61	52	480	7.75	54	504	7.88	56	528	8.01
13	52	507	8.08	54	533	8.23	56	559	8.37	58	585	8.51

Table 16.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1 to 1—Continued.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	37.0	36.00	.96	42.0	41.00	.96	47.0	46.00	.96	52.0	51.00	.97
1.2	37.4	43.44	1.13	42.4	49.44	1.14	47.4	55.44	1.15	52.4	61.44	1.15
1.4	37.8	50.96	1.31	42.8	57.96	1.32	47.8	64.96	1.33	52.8	71.96	1.33
1.6	38.2	58.56	1.48	43.2	66.56	1.49	48.2	74.56	1.50	53.2	82.56	1.51
1.8	38.6	66.24	1.65	43.6	75.24	1.67	48.6	84.24	1.68	53.6	93.24	1.69
2.0	39.0	74.00	1.82	44.0	84.00	1.84	49.0	94.00	1.86	54.0	104.00	1.87
2.2	39.4	81.84	1.99	44.4	92.84	2.01	49.4	105.84	2.03	54.4	114.84	2.04
2.4	39.8	89.76	2.15	44.8	101.76	2.17	49.8	113.76	2.20	54.8	125.76	2.21
2.6	40.2	97.76	2.31	45.2	110.76	2 34	50.2	123.76	2.36	55.2	136.76	2.38
2.8	40.6	105.84	2.47	45.6	119.84	2.50	50.6	133.84	2.53	55.6	147.84	2.55
3.0	41.0	114.00	2.62	46.0	129.00	2.66	51.0	144.00	2.69	56.0	159.00	2.72
3.2	41.4	122.24	2.78	46.4	138.24	2.82	51.4	154.24	2.85	56.4	170.24	2.86
3.4	41.8	130.56	2.93	46.8	147.56	2.97	51.8	164.56	3.01	56.8	181.56	3.05
3.6	42.2	138.96	3.08	47.2	156.96	3.13	52.2	174.96	3.17	57.2	192.96	3.21
3.8	42.6	147.44	3.22	47.6	166.44	3.28	52.6	185.44	3.33	57.6	204.44	3.36
4.0	43.0	156.00	3.37	48.0	176.00	3.43	53.0	196.00	3.48	58.0	216.00	3.52
4.2	43.4	164.64	3.51	48.4	185.64	3.58	53.4	206.64	3.63	58.4	227.64	3.68
4.4	43.8	173.36	3.65	48.8	195.36	3.73	53.8	217.36	3.78	58.8	239.36	3.83
4.6	44.2	182.16	3.79	49.2	205.16	3.87	54.2	228.16	3.93	59.2	251.16	3.99
4.8	44.6	191.04	3.93	49.6	215.04	4.01	54.6	239.04	4.08	59.6	263.04	4.14
5.0	45.0	200.00	4.07	50.0	225.00	4.16	55.0	250.00	4.23	60.0	275.00	4.29
5.2	45.4	209.04	4.20	50.4	235.04	4.30	55.4	261.04	4.37	60.4	287.04	4.44
5.4	45.8	218.16	4.34	50.8	245.16	4.43	55.8	272.16	4.52	60.8	299.16	4.58
5.6	46.2	227.36	4.47	51.2	255.36	4.57	56.2	283.36	4.65	61.2	311.36	4.73
5.8	46.6	236.64	4.60	51.6	265.64	4.71	56.6	294.64	4.80	61.6	323.64	4.87
6.0	47.0	246.00	4.73	52.0	276.00	4.84	57.0	306.00	4.94	62.0	336.00	5.02
6.2	47.4	255.44	4.86	52.4	286.44	4.98	57.4	317.44	5.07	62.4	348.44	5.16
6.4	47.8	264.96	4.99	52.8	296.96	5.11	57.8	328.96	5.21	62.8	360.96	5.30
6.6	48.2	274.56	5.12	53.2	307.56	5.24	58.2	340.56	5.35	63.2	373.56	5.44
6.8	48.6	284.24	5.24	53.6	318.24	5.37	58.6	352.24	5.48	63.6	386.24	5.58
7.0	49	294.00	5.36	54	329.00	5.50	59	364.00	5.62	64	399.00	5.72
7.5	50	318.75	5.67	55	356.25	5.83	60	393.75	5.95	65	431.25	6.06
8.0	51	344.00	5.97	56	384.00	6.13	61	424.00	6.27	66	464.00	6.39
8.5	52	369.75	6.26	57	412.25	6.44	62	454.75	6.59	67	497.25	6.72
9.0	53	396.00	6.55	58	441.00	6.74	63	486.00	6.90	68	531.00	7.04
9.5	54	422.75	6.83	59	470.25	7.03	64	517.75	7.20	69	565.25	7.35
10.0	55	450.00	7.11	60	500.00	7.32	65	550.00	7.50	70	600.00	7.66
10.5	56	477.75	7.38	61	530.25	7.61	66	582.75	7.80	71	635.25	7.97
11	57	506	7.65	62	561	7.89	67	616	8.09	72	671	8.27
12	59	564	8.18	64	624	8.44	69	684	8.67	74	744	8.86
13	61	624	8.70	66	689	8.97	71	754	9.22	76	819	9.44

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **side slopes 1½ to 1.**

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	A	r = area / wet per.	T	A	r = area / wet per.	T	A	r = area / wet per.	T	A	r = area / wet per.
0.4	3.2	1.04	.30	4.2	1.44	.32	5.2	1.84	.34	6.2	2.24	.35
0.6	3.5	1.74	.42	4.3	2.34	.45	5.8	2.94	.49	6.8	3.54	.49
0.8	4.4	2.56	.52	5.4	3.36	.57	6.4	4.16	.60	7.4	4.96	.66
1.0	5.0	3.50	.62	6.0	4.50	.68	7.0	5.50	.72	8.0	6.50	.76
1.2	5.6	4.56	.72	6.6	5.76	.79	7.6	6.96	.84	8.6	8.16	.87
1.4	6.2	5.74	.81	7.2	7.14	.89	8.2	8.54	.94	9.2	9.94	.99
1.6	6.8	7.04	.91	7.8	8.64	.99	8.8	10.24	1.04	9.8	11.84	1.10
1.8	7.4	8.46	1.00	8.4	10.26	1.08	9.4	12.06	1.15	10.4	13.86	1.21
2.0	8.0	10.00	1.09	9.0	12.00	1.18	10.0	14.00	1.25	11.0	16.00	1.31
2.2	8.6	11.66	1.17	9.6	13.86	1.27	10.6	16.06	1.35	11.6	18.26	1.41
2.4	9.2	13.44	1.26	10.2	15.84	1.36	11.2	18.24	1.44	12.2	20.64	1.51
2.6	9.8	15.34	1.35	10.8	17.94	1.45	11.8	20.54	1.54	12.8	23.14	1.62
2.8	10.4	17.36	1.44	11.4	20.16	1.54	12.4	22.96	1.63	13.4	25.76	1.72
3.0	11.0	19.50	1.52	12.0	22.50	1.63	13.0	25.50	1.72	14.0	28.50	1.80
3.2	11.6	21.76	1.61	12.6	24.96	1.72	13.6	28.16	1.81	14.6	31.36	1.90
3.4	12.2	24.14	1.69	13.2	27.54	1.80	14.2	30.94	1.90	15.2	34.34	1.99
3.6	12.8	26.64	1.78	13.8	30.24	1.89	14.8	33.84	1.99	15.8	37.44	2.08
3.8	13.4	29.26	1.86	14.4	33.06	1.98	15.4	36.86	2.08	16.4	40.66	2.17
4.0	14.0	32.00	1.95	15.0	36.00	2.07	16.0	40.00	2.17	17.0	44.00	2.27
4.2	14.6	34.86	2.03	15.6	39.06	2.15	16.6	43.26	2.26	17.6	47.46	2.36
4.4	15.2	37.84	2.12	16.2	42.24	2.24	17.2	46.64	2.35	18.2	51.04	2.45
4.6	15.8	40.94	2.20	16.8	45.54	2.32	17.8	50.14	2.44	18.8	54.74	2.54
4.8	16.4	44.16	2.29	17.4	48.96	2.41	18.4	53.76	2.52	19.4	58.56	2.62
5.0	17.0	47.50	2.37	18.0	52.50	2.50	19.0	57.50	2.61	20.0	62.50	2.72
5.2	17.6	50.96	2.45	18.6	56.16	2.58	19.6	61.36	2.69	20.6	66.56	2.80
5.4	18.2	54.54	2.54	19.2	59.94	2.66	20.2	65.34	2.78	21.2	70.74	2.89
5.6	18.8	58.24	2.62	19.8	63.84	2.75	20.8	69.44	2.87	21.8	75.04	2.97
5.8	19.4	62.06	2.70	20.4	67.86	2.83	21.4	73.66	2.95	22.4	79.46	3.06
6.0	20.0	66.00	2.79	21.0	72.00	2.92	22.0	78.00	3.04	23.0	84.00	3.15
6.2	20.6	70.06	2.87	21.6	76.26	3.00	22.6	82.46	3.12	23.6	88.66	3.23
6.4	21.2	74.24	2.95	22.2	80.64	3.08	23.2	87.04	3.20	24.2	93.44	3.32
6.6	21.8	78.54	3.03	22.8	85.14	3.17	23.8	91.74	3.29	24.8	98.34	3.40
6.8	22.4	82.96	3.12	23.4	89.76	3.25	24.4	96.56	3.37	25.4	103.36	3.49
7.0	.....	.....	.....	24.0	94.50	3.35	25.0	101.50	3.47	26.0	108.50	3.59
7.5	.....	.....	.....	25.5	106.88	3.56	26.5	114.88	3.68	27.5	121.88	3.80
8.0	.....	.....	.....	27.0	120.00	3.77	28.0	128.00	3.90	29.0	136.00	4.02
8.5	.....	.....	.....	28.5	133.88	3.98	29.5	142.38	4.11	30.5	150.88	4.25
9.0	.....	.....	.....	30.0	148.50	4.19	31.0	157.50	4.32	32.0	166.50	4.45
9.5	.....	.....	.....	.....	.....	.....	32.5	173.38	4.53	33.5	182.88	4.66
10	.....	.....	.....	.....	.....	.....	34.0	190.00	4.74	35.0	200.00	4.87
11	.....	.....	.....	.....	.....	.....	37.0	225.50	5.15	38.0	236.50	5.29

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* side slopes 1½ to 1—Continued.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	7.2	2.64	.36	8.2	3.04	.36	9.2	3.44	.36	10.2	3.84	.37
0.6	7.8	4.14	.51	8.8	4.74	.52	9.8	5.34	.53	10.8	5.94	.53
0.8	8.4	5.76	.65	9.4	6.56	.66	10.4	7.36	.68	11.4	8.16	.69
1.0	9.0	7.50	.78	10.0	8.50	.80	11.0	9.50	.82	12.0	10.50	.83
1.2	9.6	9.36	.91	10.6	10.56	.93	11.6	11.76	.95	12.6	12.96	.97
1.4	10.2	11.34	1.03	11.2	12.74	1.06	12.2	14.14	1.08	13.2	15.54	1.11
1.6	10.8	13.44	1.15	11.8	15.04	1.18	12.8	16.64	1.21	13.8	18.24	1.23
1.8	11.4	15.66	1.25	12.4	17.46	1.29	13.4	19.26	1.33	14.4	21.06	1.36
2.0	12.0	18.00	1.36	13.0	20.00	1.41	14.0	22.00	1.45	15.0	24.00	1.48
2.2	12.6	20.46	1.47	13.6	22.66	1.52	14.6	24.86	1.56	15.6	27.06	1.60
2.4	13.2	23.04	1.57	14.2	25.44	1.63	15.2	27.84	1.67	16.2	30.24	1.71
2.6	13.8	25.74	1.67	14.8	28.34	1.73	15.8	30.94	1.78	16.8	33.54	1.83
2.8	14.4	28.56	1.77	15.4	31.36	1.83	16.4	34.16	1.89	17.4	36.96	1.94
3.0	15.0	31.50	1.87	16.0	34.50	1.94	17.0	37.50	1.99	18.0	40.50	2.04
3.2	15.6	34.56	1.97	16.6	37.76	2.04	17.6	40.96	2.10	18.6	44.16	2.15
3.4	16.2	37.74	2.07	17.2	41.14	2.14	18.2	44.54	2.20	19.2	47.94	2.25
3.6	16.8	41.04	2.16	17.8	44.64	2.23	18.8	48.24	2.30	19.8	51.84	2.36
3.8	17.4	44.46	2.26	18.4	48.26	2.33	19.4	52.06	2.40	20.4	55.86	2.46
4.0	18.0	48.00	2.35	19.0	52.00	2.43	20.0	56.00	2.50	21.0	60.00	2.56
4.2	18.6	51.66	2.44	19.6	55.86	2.52	20.6	60.06	2.59	21.6	64.26	2.66
4.4	19.2	55.44	2.53	20.2	59.84	2.62	21.2	64.24	2.69	22.2	68.64	2.76
4.6	19.8	59.34	2.62	20.8	63.94	2.71	21.8	68.54	2.79	22.8	73.14	2.86
4.8	20.4	63.36	2.72	21.4	68.16	2.80	22.4	72.96	2.88	23.4	77.76	2.96
5.0	21.0	67.50	2.81	22.0	72.50	2.90	23.0	77.50	2.98	24.0	82.50	3.05
5.2	21.6	71.76	2.90	22.6	76.96	2.99	23.6	82.16	3.07	24.6	87.36	3.14
5.4	22.2	76.14	2.99	23.2	81.54	3.08	24.2	86.94	3.16	25.2	92.34	3.24
5.6	22.8	80.64	3.07	23.8	86.24	3.17	24.8	91.84	3.25	25.8	97.44	3.33
5.8	23.4	85.26	3.16	24.4	91.06	3.25	25.4	96.86	3.34	26.4	102.66	3.43
6.0	24.0	90.00	3.26	25.0	96.00	3.35	26.0	102.00	3.44	27.0	108.00	3.52
6.2	24.6	94.86	3.34	25.6	101.06	3.43	26.6	107.26	3.53	27.6	113.46	3.60
6.4	25.2	99.84	3.42	26.2	106.24	3.52	27.2	112.64	3.62	28.2	119.04	3.70
6.6	25.8	104.94	3.51	26.8	111.54	3.61	27.8	118.14	3.71	28.8	124.74	3.79
6.8	26.4	110.16	3.60	27.4	116.96	3.70	28.4	123.76	3.80	29.4	130.56	3.89
7.0	27.0	115.50	3.70	28.0	122.50	3.80	29.0	129.50	3.90	30.0	136.50	3.99
7.5	28.5	129.38	3.92	29.5	136.88	4.02	30.5	144.38	4.12	31.5	151.88	4.21
8.0	30.0	144.00	4.13	31.0	152.00	4.24	32.0	160.00	4.34	33.0	168.00	4.44
8.5	31.5	159.38	4.35	32.5	167.38	4.45	33.5	176.38	4.56	34.5	184.88	4.66
9.0	33.0	175.50	4.56	34.0	184.50	4.66	35.0	193.50	4.78	36.0	202.50	4.89
9.5	34.5	192.38	4.78	35.5	201.88	4.89	36.5	211.38	5.00	37.5	220.88	5.11
10	36.0	210.00	4.99	37.0	220.00	5.11	38.0	230.00	5.22	39.0	240.00	5.33
11	39.0	247.50	5.42	40.0	258.50	5.54	41.0	269.50	5.65	42.0	280.50	5.76

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1½ to 1—Continued.

Depth	Bottom width 10 feet.			Bottom width 12 feet			Bottom width 14 feet			Bottom width 16 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	13.0	11.50	.85	15.0	13.50	.87	17.0	15.50	.88	19.0	17.50	.89
1.2	13.6	14.16	.99	15.6	16.56	1.01	17.6	18.96	1.08	19.6	21.36	1.05
1.4	14.2	16.94	1.13	16.2	19.74	1.16	18.2	22.54	1.18	20.2	25.34	1.20
1.6	14.8	19.84	1.26	16.8	23.04	1.30	18.8	26.24	1.33	20.8	29.44	1.35
1.8	15.4	22.86	1.39	17.4	26.46	1.43	19.4	30.06	1.47	21.4	33.66	1.50
2.0	16.0	26.00	1.51	18.0	30.00	1.56	20.0	34.00	1.60	22.0	38.00	1.64
2.2	16.6	29.26	1.63	18.6	33.66	1.69	20.6	38.06	1.74	22.6	42.46	1.77
2.4	17.2	32.64	1.75	19.2	37.44	1.81	21.2	42.24	1.86	23.2	47.04	1.91
2.6	17.8	36.14	1.87	19.8	41.34	1.93	21.8	46.54	1.99	23.8	51.74	2.04
2.8	18.4	39.76	1.98	20.4	45.36	2.05	22.4	50.96	2.11	24.4	56.56	2.17
3.0	19.0	43.50	2.09	21.0	49.50	2.17	23.0	55.50	2.24	25.0	61.50	2.29
3.2	19.6	47.36	2.20	21.6	53.76	2.28	23.6	60.16	2.36	25.6	66.56	2.42
3.4	20.2	51.34	2.31	22.2	58.14	2.40	24.2	64.94	2.47	26.2	71.74	2.54
3.6	20.8	55.44	2.41	22.8	62.64	2.51	24.8	69.84	2.59	26.8	77.04	2.65
3.8	21.4	59.66	2.52	23.4	67.26	2.62	25.4	74.86	2.70	27.4	82.46	2.78
4.0	22.0	64.00	2.62	24.0	72.00	2.73	26.0	80.00	2.81	28.0	88.00	2.89
4.2	22.6	68.46	2.72	24.6	76.86	2.83	26.6	85.26	2.92	28.6	93.66	3.01
4.4	23.2	73.04	2.82	25.2	81.84	2.94	27.2	90.64	3.03	29.2	99.44	3.12
4.6	23.8	77.74	2.92	25.8	86.94	3.04	27.8	96.14	3.14	29.8	105.34	3.23
4.8	24.4	82.56	3.02	26.4	92.16	3.14	28.4	101.76	3.25	30.4	111.36	3.34
5.0	25.0	87.50	3.12	27.0	97.50	3.25	29.0	107.50	3.36	31.0	117.50	3.45
5.2	25.6	92.56	3.22	27.6	102.96	3.35	29.6	113.36	3.46	31.6	123.76	3.56
5.4	26.2	97.74	3.31	28.2	108.54	3.45	30.2	119.34	3.56	32.2	130.14	3.67
5.6	26.8	103.04	3.41	28.8	114.24	3.55	30.8	125.44	3.66	32.8	136.64	3.77
5.8	27.4	108.46	3.50	29.4	120.06	3.64	31.4	131.66	3.77	33.4	143.26	3.88
6.0	28.0	114.00	3.60	30.0	126.00	3.75	32.0	138.00	3.87	34.0	150.00	3.99
6.2	28.6	119.66	3.69	30.6	132.06	3.84	32.6	144.46	3.97	34.6	156.86	4.09
6.4	29.2	125.44	3.79	31.2	138.24	3.94	33.2	151.04	4.07	35.2	163.84	4.19
6.6	29.8	131.34	3.88	31.8	144.54	4.03	33.8	157.74	4.17	35.8	170.94	4.29
6.8	30.4	137.36	3.98	32.4	150.96	4.13	34.4	164.56	4.27	36.4	178.16	4.39
7.0	31.0	143.50	4.07	33.0	157.50	4.23	35.0	171.50	4.37	37.0	185.50	4.50
7.5	32.5	159.38	4.30	34.5	174.38	4.47	36.5	189.38	4.61	38.5	204.38	4.75
8.0	34.0	176.00	4.53	36.0	192.00	4.70	38.0	208.00	4.85	40.0	224.00	4.99
8.5	35.5	193.38	4.76	37.5	210.38	4.93	39.5	227.38	5.09	41.5	244.38	5.24
9.0	37.0	211.50	4.98	39.0	229.50	5.16	41.0	247.50	5.33	43.0	265.50	5.48
9.5	38.5	230.38	5.21	40.5	249.38	5.39	42.5	268.38	5.56	44.5	287.38	5.72
10.0	40.0	250.00	5.43	42.0	270.00	5.62	44.0	290.00	5.79	46.0	310.00	5.96
10.5	41.5	270.38	5.65	43.5	291.38	5.84	45.5	312.38	6.02	47.5	333.38	6.19
11	43	291.5	5.87	45	313.5	6.07	47	335.5	6.25	49	357.5	6.42
12	46	336.0	6.31	48	360.0	6.51	50	384.0	6.70	52	408.0	6.88
13	49	383.5	6.74	51	409.5	6.95	53	435.5	7.15	55	461.5	7.34

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1½ to 1—Continued.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	A	area / wet. per. = r	T	A	area / wet. per. = r	T	A	area / wet. per. = r	T	A	area / wet. per. = r
1.0	21.0	19.50	.90	23.0	21.50	.91	25.0	23.50	.92	27.0	25.50	.92
1.2	21.6	23.76	1.06	23.6	26.16	1.08	25.6	28.56	1.08	27.6	30.96	1.09
1.4	22.2	28.14	1.22	24.2	30.94	1.24	26.2	33.74	1.24	28.2	36.54	1.26
1.6	22.8	32.64	1.37	24.8	35.84	1.39	26.8	39.04	1.40	28.8	42.24	1.42
1.8	23.4	37.26	1.52	25.4	40.86	1.54	27.4	44.46	1.55	29.4	48.06	1.58
2.0	24.0	42.00	1.67	26.0	46.00	1.69	28.0	50.00	1.71	30.0	54.00	1.73
2.2	24.6	46.86	1.81	26.6	51.26	1.84	28.6	55.66	1.86	30.6	60.06	1.88
2.4	25.2	51.84	1.94	27.2	56.64	1.98	29.2	61.44	2.00	31.2	66.24	2.03
2.6	25.8	56.94	2.08	27.8	62.14	2.12	29.8	67.34	2.15	31.8	72.54	2.17
2.8	26.4	62.16	2.21	28.4	67.76	2.25	30.4	73.36	2.29	32.4	78.96	2.32
3.0	27.0	67.50	2.34	29.0	73.50	2.38	31.0	79.50	2.42	33.0	85.50	2.46
3.2	27.6	72.96	2.47	29.6	79.36	2.52	31.6	85.76	2.56	33.6	92.16	2.59
3.4	28.2	78.54	2.60	30.2	85.34	2.65	32.2	92.14	2.69	34.2	98.94	2.73
3.6	28.8	84.24	2.72	30.8	91.44	2.77	32.8	98.64	2.82	34.8	105.84	2.86
3.8	29.4	90.06	2.84	31.4	97.66	2.90	33.4	105.26	2.95	35.4	112.86	2.99
4.0	30.0	96.00	2.96	32.0	104.00	3.02	34.0	112.00	3.08	36.0	120.00	3.12
4.2	30.6	102.06	3.08	32.6	110.46	3.14	34.6	118.86	3.20	36.6	127.26	3.25
4.4	31.2	108.24	3.20	33.2	117.04	3.26	35.2	125.84	3.32	37.2	134.64	3.38
4.6	31.8	114.54	3.31	33.8	123.74	3.38	35.8	132.94	3.44	37.8	142.14	3.50
4.8	32.4	120.96	3.43	34.4	130.56	3.50	36.4	140.16	3.56	38.4	149.76	3.63
5.0	33.0	127.50	3.54	35.0	137.50	3.62	37.0	147.50	3.68	39.0	157.50	3.75
5.2	33.6	134.16	3.65	35.6	144.56	3.73	37.6	154.96	3.80	39.6	165.36	3.87
5.4	34.2	140.94	3.76	36.2	151.74	3.84	38.2	162.54	3.92	40.2	173.34	3.99
5.6	34.8	147.84	3.87	36.8	159.04	3.95	38.8	170.24	4.03	40.8	181.44	4.11
5.8	35.4	154.86	3.97	37.4	166.46	4.05	39.4	178.06	4.15	41.4	189.66	4.22
6.0	36.0	162.00	4.09	38.0	174.00	4.18	40.0	186.00	4.26	42.0	198.00	4.34
6.2	36.6	169.26	4.17	38.6	181.66	4.27	40.6	194.06	4.38	42.6	206.46	4.45
6.4	37.2	176.64	4.27	39.2	189.44	4.37	41.2	202.24	4.49	43.2	215.04	4.57
6.6	37.8	184.14	4.37	39.8	197.34	4.47	41.8	210.54	4.60	43.8	223.74	4.68
6.8	38.4	191.76	4.47	40.4	205.36	4.57	42.4	218.96	4.71	44.4	232.56	4.79
7.0	39.0	199.50	4.61	41.0	213.50	4.72	43.0	227.50	4.82	45.0	241.50	4.90
7.5	40.5	219.38	4.87	42.5	234.38	4.98	44.5	249.38	5.08	46.5	264.38	5.18
8.0	42.0	240.00	5.12	44.0	256.00	5.24	46.0	272.00	5.35	48.0	288.00	5.45
8.5	43.5	261.38	5.37	45.5	278.38	5.50	47.5	295.38	5.61	49.5	312.38	5.72
9.0	45.0	283.50	5.62	47.0	301.50	5.75	49.0	319.50	5.87	51.0	337.50	5.98
9.5	46.5	306.38	5.86	48.5	325.38	6.00	50.5	344.38	6.12	52.5	363.38	6.24
10.0	48.0	330.00	6.10	50.0	350.00	6.24	52.0	370.00	6.37	54.0	390.00	6.49
10.5	49.5	354.38	6.34	51.5	375.38	6.49	53.5	396.38	6.62	55.5	417.38	6.75
11	51	379.5	6.58	53	401.5	6.73	55	423.5	6.87	57	445.5	7.00
12	54	432.0	7.05	56	456.0	7.21	58	480.0	7.35	60	504.0	7.49
13	57	487.5	7.51	59	513.5	7.68	61	539.5	7.83	63	565.5	7.98

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1½ to 1—Continued.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	A	area / wet per. = r	T	A	area / wet per. = r	T	A	area / wet per. = r	T	A	area / wet per. = r
1.0	29.0	27.50	.93	31.0	29.50	.93	33.0	31.50	.94	35.0	33.50	.94
1.2	29.6	33.36	1.10	31.6	35.76	1.11	33.6	38.16	1.11	35.6	40.56	1.12
1.4	30.2	39.34	1.27	32.2	42.14	1.28	34.2	44.94	1.28	36.2	47.74	1.29
1.6	30.8	45.42	1.45	32.8	48.64	1.44	34.8	51.84	1.45	36.8	55.04	1.46
1.8	31.4	51.66	1.59	33.4	55.26	1.69	35.4	58.86	1.61	37.4	62.46	1.62
2.0	32.0	58.00	1.75	34.0	62.00	1.76	36.0	66.00	1.77	38.0	70.00	1.78
2.2	32.6	64.46	1.90	34.6	68.86	1.92	36.6	73.26	1.93	38.6	77.66	1.94
2.4	33.2	71.04	2.05	35.2	75.84	2.07	37.2	80.64	2.09	39.2	85.44	2.10
2.6	33.8	77.74	2.20	35.8	82.94	2.23	37.8	88.14	2.24	39.8	93.34	2.25
2.8	34.4	84.56	2.34	36.4	90.16	2.37	38.4	95.76	2.39	40.4	101.36	2.41
3.0	35.0	91.50	2.48	37.0	97.50	2.51	39.0	103.50	2.54	41.0	109.50	2.56
3.2	35.6	98.56	2.63	37.6	104.96	2.65	39.6	111.36	2.68	41.6	117.76	2.70
3.4	36.2	105.74	2.76	38.2	112.54	2.79	40.2	119.34	2.82	42.2	126.14	2.85
3.6	36.8	113.04	2.90	38.8	120.24	2.93	40.8	127.44	2.97	42.8	134.64	2.99
3.8	37.4	120.46	3.03	39.4	128.06	3.07	41.4	135.66	3.10	43.4	143.26	3.13
4.0	38.0	128.00	3.17	40.0	136.00	3.21	42.0	144.00	3.24	44.0	152.00	3.27
4.2	38.6	135.66	3.30	40.6	144.06	3.34	42.6	152.46	3.38	44.6	160.86	3.41
4.4	39.2	143.44	3.43	41.2	152.24	3.47	43.2	161.04	3.51	45.2	169.84	3.55
4.6	39.8	151.34	3.55	41.8	160.54	3.60	43.8	169.74	3.64	45.8	178.94	3.68
4.8	40.4	159.36	3.68	42.4	168.96	3.73	44.4	178.56	3.77	46.4	188.16	3.82
5.0	41.0	167.50	3.80	43.0	177.50	3.86	45.0	187.50	3.90	47.0	197.50	3.95
5.2	41.6	175.76	3.93	43.6	186.16	3.98	45.6	196.56	4.03	47.6	206.96	4.08
5.4	42.2	184.14	4.05	44.2	194.94	4.11	46.2	205.74	4.16	48.2	216.54	4.21
5.6	42.8	192.64	4.17	44.8	203.84	4.23	46.8	215.04	4.28	48.8	226.24	4.33
5.8	43.4	201.26	4.29	45.4	212.86	4.35	47.4	224.46	4.41	49.4	236.06	4.46
6.0	44.0	210.00	4.41	46.0	222.00	4.47	48.0	234.00	4.53	50.0	246.00	4.59
6.2	44.6	218.86	4.53	46.6	231.26	4.59	48.6	243.66	4.65	50.6	256.06	4.71
6.4	45.2	227.84	4.64	47.2	240.64	4.71	49.2	253.44	4.77	51.2	266.24	4.83
6.6	45.8	236.94	4.76	47.8	250.14	4.83	49.8	263.34	4.89	51.8	276.54	4.96
6.8	46.4	246.16	4.87	48.4	259.76	4.95	50.4	273.36	5.01	52.4	286.96	5.08
7.0	47.0	255.50	4.99	49.0	269.50	5.06	51.0	283.50	5.13	53.0	297.50	5.20
7.5	48.5	279.38	5.27	50.5	294.38	5.35	52.5	309.38	5.42	54.5	324.38	5.49
8.0	50.0	304.00	5.54	52.0	320.00	5.63	54.0	336.00	5.71	56.0	352.00	5.79
8.5	51.5	329.38	5.81	53.5	346.38	5.91	55.5	363.38	5.99	57.5	380.38	6.07
9.0	53.0	355.50	6.08	55.0	372.50	6.18	57.0	391.50	6.27	59.0	409.50	6.35
9.5	54.5	382.38	6.35	56.5	401.38	6.45	58.5	420.38	6.55	60.5	439.38	6.63
10.0	56.0	410.00	6.61	58.0	430.00	6.71	60.0	450.00	6.82	62.0	470.00	6.91
10.5	57.5	438.38	6.86	59.5	459.38	6.98	61.5	480.38	7.08	63.5	501.38	7.18
11	59	467.5	7.12	61	489.5	7.24	63	511.5	7.34	65	533.5	7.45
12	62	528.0	7.62	64	552.0	7.75	66	576.0	7.86	68	600.0	7.97
13	65	591.5	8.12	67	617.5	8.25	69	643.5	8.37	71	669.5	8.49

Table 17.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 1½ to 1—Continued.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	38.0	36.50	.95	43.0	41.50	.95	48.0	46.50	.96	53.0	51.50	.96
1.2	38.6	44.16	1.12	43.6	50.16	1.13	48.6	56.16	1.14	53.6	62.16	1.14
1.4	39.2	51.94	1.30	44.2	58.94	1.31	49.2	65.94	1.32	54.2	72.94	1.33
1.6	39.8	59.84	1.47	44.8	67.84	1.48	49.8	75.84	1.49	54.8	83.84	1.50
1.8	40.4	67.86	1.64	45.4	76.86	1.65	50.4	85.86	1.67	55.4	94.86	1.68
2.0	41.0	76.00	1.80	46.0	86.00	1.82	51.0	96.00	1.84	56.0	106.00	1.85
2.2	41.6	84.26	1.96	46.6	95.26	1.99	51.6	106.26	2.01	56.6	117.26	2.02
2.4	42.2	92.64	2.12	47.2	104.64	2.15	52.2	116.64	2.17	57.2	128.64	2.19
2.6	42.8	101.14	2.28	47.8	114.14	2.31	52.8	127.14	2.34	57.8	140.14	2.36
2.8	43.4	109.76	2.43	48.4	123.76	2.47	53.4	137.76	2.50	58.4	151.76	2.53
3.0	44.0	118.50	2.59	49.0	133.50	2.63	54.0	148.50	2.66	59.0	163.50	2.69
3.2	44.6	127.36	2.74	49.6	143.36	2.78	54.6	159.36	2.82	59.6	175.36	2.85
3.4	45.2	136.34	2.88	50.2	153.34	2.93	55.2	170.34	2.97	60.2	187.34	3.01
3.6	45.8	145.44	3.03	50.8	163.44	3.09	55.8	181.44	3.13	60.8	199.44	3.17
3.8	46.4	154.66	3.18	51.4	173.66	3.23	56.4	192.66	3.28	61.4	211.66	3.32
4.0	47.0	164.00	3.32	52.0	184.00	3.36	57.0	204.00	3.43	62.0	224.00	3.48
4.2	47.6	173.46	3.46	52.6	194.46	3.53	57.6	215.46	3.58	62.6	236.46	3.63
4.4	48.2	183.04	3.60	53.2	205.04	3.67	58.2	227.04	3.73	63.2	249.04	3.78
4.6	48.8	192.74	3.74	53.8	215.74	3.81	58.8	238.74	3.88	63.8	261.74	3.93
4.8	49.4	202.56	3.87	54.4	226.56	3.95	59.4	250.56	4.02	64.4	274.56	4.08
5.0	50.0	212.50	4.01	55.0	237.50	4.09	60.0	262.50	4.17	65.0	287.50	4.23
5.2	50.6	222.56	4.14	55.6	248.56	4.23	60.6	274.56	4.30	65.6	300.56	4.37
5.4	51.2	232.74	4.27	56.2	259.74	4.37	61.2	286.74	4.45	66.2	313.74	4.52
5.6	51.8	243.04	4.40	56.8	271.04	4.50	61.8	299.04	4.58	66.8	327.04	4.66
5.8	52.4	253.46	4.53	57.4	282.46	4.63	62.4	311.46	4.72	67.4	340.46	4.79
6.0	53.0	264.00	4.66	58.0	294.00	4.77	63.0	324.00	4.86	68.0	354.00	4.94
6.2	53.6	274.66	4.79	58.6	305.66	4.88	63.6	336.66	4.98	68.6	367.66	5.07
6.4	54.2	285.44	4.91	59.2	317.44	5.01	64.2	349.44	5.11	69.2	381.44	5.20
6.6	54.8	296.34	5.04	59.8	329.34	5.14	64.8	362.34	5.24	69.8	395.34	5.33
6.8	55.4	307.36	5.16	60.4	341.36	5.26	65.4	375.36	5.37	70.4	409.36	5.46
7.0	56.0	318.50	5.29	61.0	353.50	5.42	66.0	388.50	5.52	71.0	423.50	5.63
7.5	57.5	346.88	5.59	62.5	384.38	5.75	67.5	421.88	5.86	72.5	459.38	5.96
8.0	59.0	376.00	5.89	64.0	416.00	6.04	69.0	456.00	6.18	74.0	496.00	6.29
8.5	60.5	405.88	6.18	65.5	448.38	6.35	70.5	490.88	6.49	75.5	533.38	6.61
9.0	62.0	436.50	6.47	67.0	481.50	6.65	72.0	526.50	6.80	77.0	571.50	6.93
9.5	63.5	467.88	6.76	68.5	515.38	6.94	73.5	562.88	7.10	78.5	610.38	7.24
10.0	65.0	500.00	7.04	70.0	550.00	7.23	75.0	600.00	7.40	80.0	650.00	7.55
10.5	66.5	532.88	7.32	71.5	585.38	7.52	76.5	637.88	7.70	81.5	690.38	7.86
11	68	566.5	7.59	73	621.5	7.80	78	676.5	7.99	83	731.5	8.16
11	71	636.0	8.33	76	696.0	8.36	81	756.0	8.56	86	816.0	8.75
12	74	708.5	8.65	79	778.5	8.90	84	838.5	9.13	89	903.5	9.33

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 2 to 1.

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	3.6	1.12	.30	4.6	1.52	.32	5.6	1.92	.33	6.6	2.32	.34
0.6	4.4	1.92	.41	5.4	2.52	.44	6.4	3.12	.47	7.4	3.72	.48
0.8	5.2	2.88	.52	6.2	3.68	.56	7.2	4.48	.59	8.2	5.28	.62
1.0	6.0	4.00	.62	7.0	5.00	.67	8.0	6.00	.71	9.0	7.00	.74
1.2	6.8	5.28	.72	7.8	6.48	.77	8.8	7.68	.82	9.8	8.88	.86
1.4	7.6	6.72	.81	8.6	8.12	.88	9.6	9.52	.93	10.6	10.92	.97
1.6	8.4	8.32	.91	9.4	9.92	.98	10.4	11.52	1.08	11.4	13.12	1.08
1.8	9.2	10.08	1.00	10.2	11.88	1.08	11.2	13.68	1.14	12.2	15.48	1.19
2.0	10.0	12.00	1.09	11.0	14.00	1.17	12.0	16.00	1.24	13.0	18.00	1.29
2.2	10.8	14.08	1.19	11.8	16.28	1.27	12.8	18.48	1.34	13.8	20.68	1.39
2.4	11.6	16.32	1.28	12.6	18.72	1.36	13.6	21.12	1.43	14.6	23.52	1.49
2.6	12.4	18.72	1.37	13.4	21.32	1.46	14.4	23.92	1.53	15.4	26.52	1.59
2.8	13.2	21.28	1.47	14.2	24.08	1.55	15.2	26.88	1.63	16.2	29.68	1.69
3.0	14.0	24.00	1.56	15.0	27.00	1.64	16.0	30.00	1.72	17 0	33.00	1.79
3.2	14.8	26.88	1.65	15.8	30.08	1.74	16.8	33.28	1.82	17 8	36.48	1.89
3.4	15.6	29.92	1.74	16.6	33.32	1.83	17.6	36.72	1.91	18 6	40.12	1.99
3.6	16.4	33.12	1.83	17.4	36.72	1.92	18.4	40.32	2.01	19.4	43.92	2.08
3.8	17.2	36.48	1.92	18.2	40.28	2.02	19.2	44.08	2.10	20.2	47.88	2.18
4.0	18.0	40.00	2.01	19.0	44.00	2.11	20.0	48.00	2.19	21.0	52.00	2.27
4.2	18.8	43.68	2.10	19.8	47.88	2.20	20.8	52.08	2.29	21.8	56.28	2.37
4.4	19.6	47.52	2.19	20.6	51.92	2.29	21.6	56.32	2.38	22.6	60.72	2.46
4.6	20.4	51.52	2.28	21.4	56.12	2.38	22.4	60.72	2.47	23.4	65.32	2.55
4.8	21.2	55.68	2.37	22.2	60.48	2.47	23.2	65.28	2.56	24.2	70.08	2.65
5.0	22.0	60.00	2.46	23.0	65.00	2.56	24.0	70.00	2.66	25.0	75.00	2.74
5.2	22.8	64.48	2.55	23.8	69.68	2.65	24.8	74.88	2.75	25.8	80.08	2.83
5.4	23.6	69.12	2.64	24.6	74.52	2.74	25.6	79.92	2.84	26.6	85.32	2.92
5.6	24.4	73.92	2.73	25.4	79.52	2.83	26.4	85.12	2.93	27.4	90.72	3.02
5.8	25.2	78.88	2.82	26.2	84.68	2.93	27.2	90.48	3.02	28.2	96.28	3.11
6.0	26.0	84.00	2.91	27.0	90.00	3.02	28.0	96.00	3.11	29.0	102.00	3.20
6.2	26.8	89.28	3.00	27.8	95.48	3.11	28.8	101.68	3.21	29.8	107.88	3.30
6.4	27.6	94.72	3.09	28.6	101.12	3.20	29.6	107.52	3.30	30.6	113.92	3.39
6.6	28.4	100.32	3.18	29.4	106.92	3.29	30.4	113.52	3.39	31.4	120.12	3.48
6.8	29.2	106.08	3.27	30.2	112.88	3.38	31.2	119.68	3.48	32.2	126.48	3.57
7.0	.....	.....	.....	31	119	3.47	32	126.0	3.57	33	133	3.66
7.5	.....	.....	.....	33	135	3.69	34	142.5	3.80	35	150	3.89
8.0	.....	.....	.....	35	152	3.92	36	160.0	4.02	37	168	4.12
8.5	.....	.....	.....	37	170	4.15	38	178.5	4.25	39	187	4.35
9.0	.....	.....	.....	39	189	4.37	40	198.0	4.47	41	207	4.57
9.5	.....	.....	.....	.....	.....	.....	42	218.5	4.70	43	228	4.80
10	.....	.....	.....	.....	.....	.....	44	240.0	4.93	45	250	5.03
11	.....	.....	.....	.....	.....	.....	48	286	5.38	49	297	5.48

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 2 to 1—Continued.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	7.6	2.72	.35	8.6	3.12	.35	9.6	3.52	.36	10.6	3.92	.36
0.6	8.4	4.32	.50	9.4	4.92	.51	10.4	5.52	.52	11.4	6.12	.52
0.8	9.2	6.08	.64	10.2	6.88	.65	11.2	7.68	.66	12.2	8.48	.67
1.0	10.0	8.00	.76	11.0	9.00	.78	12.0	10.00	.80	13.0	11.00	.82
1.2	10.8	10.08	.89	11.8	11.28	.91	12.8	12.48	.93	13.8	13.68	.95
1.4	11.6	12.32	1.00	12.6	13.72	1.08	13.6	15.12	1.06	14.6	16.52	1.08
1.6	12.4	14.72	1.12	13.4	16.32	1.15	14.4	17.92	1.18	15.4	19.52	1.21
1.8	13.2	17.28	1.23	14.2	19.08	1.27	15.2	20.88	1.30	16.2	22.68	1.33
2.0	14.0	20.00	1.33	15.0	22.00	1.38	16.0	24.00	1.41	17.0	26.00	1.44
2.2	14.8	22.88	1.44	15.8	25.08	1.49	16.8	27.28	1.53	17.8	29.48	1.56
2.4	15.6	25.92	1.55	16.6	28.32	1.60	17.6	30.72	1.64	18.6	33.12	1.68
2.6	16.4	29.12	1.65	17.4	31.72	1.70	18.4	34.32	1.75	19.4	36.92	1.79
2.8	17.2	32.48	1.75	18.2	35.28	1.81	19.2	38.08	1.86	20.2	40.88	1.90
3.0	18.0	36.00	1.85	19.0	39.00	1.91	20.0	42.00	1.96	21.0	45.00	2.01
3.2	18.8	39.68	1.95	19.8	42.88	2.01	20.8	46.08	2.07	21.8	49.28	2.11
3.4	19.6	43.52	2.05	20.6	46.92	2.11	21.6	50.32	2.17	22.6	53.72	2.22
3.6	20.4	47.52	2.15	21.4	51.12	2.21	22.4	54.72	2.27	23.4	58.32	2.32
3.8	21.2	51.68	2.25	22.2	55.48	2.31	23.2	59.28	2.37	24.2	63.08	2.43
4.0	22.0	56.00	2.34	23.0	60.00	2.41	24.0	64.00	2.47	25.0	68.00	2.53
4.2	22.8	60.48	2.44	23.8	64.68	2.51	24.8	68.88	2.57	25.8	73.08	2.63
4.4	23.6	65.12	2.54	24.6	69.52	2.61	25.6	73.92	2.67	26.6	78.32	2.73
4.6	24.4	69.92	2.63	25.4	74.52	2.70	26.4	79.12	2.77	27.4	83.72	2.83
4.8	25.2	74.88	2.73	26.2	79.68	2.80	27.2	84.48	2.87	28.2	89.28	2.93
5.0	26.0	80.00	2.82	27.0	85.00	2.90	28.0	90.00	2.96	29.0	95.00	3.03
5.2	26.8	85.28	2.92	27.8	90.48	2.99	28.8	95.68	3.06	29.8	100.88	3.13
5.4	27.6	90.72	3.01	28.6	96.12	3.08	29.6	101.52	3.16	30.6	106.92	3.23
5.6	28.4	96.32	3.10	29.4	101.92	3.18	30.4	107.52	3.26	31.4	113.12	3.32
5.8	29.2	102.08	3.20	30.2	107.88	3.28	31.2	113.68	3.35	32.2	119.48	3.42
6.0	30.0	108.00	3.29	31.0	114.00	3.37	32.0	120.00	3.45	33.0	126.00	3.52
6.2	30.8	114.08	3.38	31.8	120.28	3.46	32.8	126.48	3.54	33.8	132.68	3.61
6.4	31.6	120.32	3.48	32.6	126.72	3.56	33.6	133.12	3.64	34.6	139.52	3.71
6.6	32.4	126.72	3.57	33.4	133.32	3.65	34.4	139.92	3.73	35.4	146.52	3.81
6.8	33.2	133.28	3.66	34.2	140.08	3.75	35.2	146.88	3.82	36.2	153.68	3.90
7.0	34	140.0	3.75	35	147	3.84	36	154.0	3.92	37	161	4.00
7.5	36	157.5	3.98	37	165	4.07	38	172.5	4.15	39	180	4.23
8.0	38	176.0	4.21	39	184	4.30	40	192.0	4.39	41	200	4.47
8.5	40	195.5	4.44	41	204	4.53	42	212.5	4.62	43	221	4.70
9.0	42	216.0	4.67	43	225	4.76	44	234.0	4.85	45	243	4.93
9.5	44	237.5	4.90	45	247	4.99	46	256.5	5.08	47	266	5.17
10	46	260.0	5.13	47	270	5.22	48	280.0	5.31	49	290	5.40
11	50	308	5.58	51	319	5.68	52	330	5.77	53	341	5.86

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 2 to 1—Continued.

Depth	Bottom width 10 feet			Bottom width 12 feet			Bottom width 14 feet			Bottom width 16 feet		
	T	A	r = area / wet per.	T	A	r = area / wet per.	T	A	r = area / wet per.	T	A	r = area / wet per.
1.0	14.0	12.00	.83	16.0	14.00	.85	18.0	16.00	.87	20.0	18.00	.88
1.2	14.8	14.88	.97	16.8	17.28	1.00	18.8	19.68	1.02	20.8	22.08	1.03
1.4	15.6	17.92	1.10	17.6	20.72	1.13	19.6	23.52	1.16	21.6	26.32	1.18
1.6	16.4	21.12	1.23	18.4	24.32	1.27	20.4	27.52	1.30	22.4	30.72	1.33
1.8	17.2	24.48	1.36	19.2	28.08	1.40	21.2	31.68	1.44	23.2	35.28	1.47
2.0	18.0	28.00	1.48	20.0	32.00	1.52	22.0	36.00	1.57	24.0	40.00	1.60
2.2	18.8	31.68	1.60	20.8	36.08	1.65	22.8	40.48	1.70	24.8	44.88	1.74
2.4	19.6	35.52	1.71	21.6	40.32	1.77	23.6	45.12	1.82	25.6	49.92	1.87
2.6	20.4	39.52	1.83	22.4	44.72	1.89	24.4	49.92	1.95	26.4	55.12	1.99
2.8	21.2	43.68	1.94	23.2	49.28	2.01	25.2	54.88	2.07	27.2	60.48	2.12
3.0	22.0	48.00	2.05	24.0	54.00	2.12	26.0	60.00	2.19	28.0	66.00	2.24
3.2	22.8	52.48	2.16	24.8	58.88	2.24	26.8	65.28	2.31	28.8	71.68	2.36
3.4	23.6	57.12	2.27	25.6	63.92	2.35	27.6	70.72	2.42	29.6	77.52	2.48
3.6	24.4	61.92	2.37	26.4	69.12	2.46	28.4	76.32	2.54	30.4	83.52	2.60
3.8	25.2	66.88	2.48	27.2	74.48	2.57	29.2	82.08	2.65	31.2	89.68	2.72
4.0	26.0	72.00	2.58	28.0	80.00	2.68	30.0	88.00	2.76	32.0	96.00	2.83
4.2	26.8	77.28	2.69	28.8	85.68	2.78	30.8	94.08	2.87	32.8	102.48	2.95
4.4	27.6	82.72	2.79	29.6	91.52	2.89	31.6	100.32	2.98	33.6	109.12	3.06
4.6	28.4	88.32	2.89	30.4	97.52	2.99	32.4	106.72	3.09	34.4	115.92	3.17
4.8	29.2	94.08	2.99	31.2	103.68	3.10	33.2	113.28	3.19	35.2	122.88	3.28
5.0	30.0	100.00	3.09	32.0	110.00	3.20	34.0	120.00	3.30	36.0	130.00	3.39
5.2	30.8	106.08	3.19	32.8	116.48	3.30	34.8	126.88	3.41	36.8	137.28	3.50
5.4	31.6	112.32	3.29	33.6	123.12	3.41	35.6	133.92	3.51	37.6	144.72	3.61
5.6	32.4	118.72	3.39	34.4	129.92	3.51	36.4	141.12	3.61	38.4	152.32	3.71
5.8	33.2	125.28	3.49	35.2	136.88	3.61	37.2	148.48	3.72	39.2	160.08	3.82
6.0	34.0	132.00	3.59	36.0	144.00	3.71	38.0	156.00	3.82	40.0	168.00	3.93
6.2	34.8	138.88	3.68	36.8	151.28	3.81	38.8	163.68	3.92	40.8	176.08	4.03
6.4	35.6	145.92	3.78	37.6	158.72	3.91	39.6	171.52	4.03	41.6	184.32	4.13
6.6	36.4	153.12	3.88	38.4	166.32	4.01	40.4	179.52	4.13	42.4	192.72	4.24
6.8	37.2	160.48	3.97	39.2	174.08	4.11	41.2	187.68	4.23	43.2	201.28	4.34
7.0	38	168.0	4.07	40	182.0	4.20	42	196.0	4.33	44	210.0	4.44
7.5	40	187.5	4.31	42	202.5	4.45	44	217.5	4.58	46	232.5	4.69
8.0	42	208.0	4.54	44	224.0	4.69	46	240.0	4.82	48	256.0	4.94
8.5	44	229.5	4.78	46	246.5	4.93	48	263.5	5.07	50	280.5	5.19
9.0	46	252.0	5.01	48	270.0	5.17	50	288.0	5.31	52	306.0	5.44
9.5	48	275.5	5.25	50	294.5	5.41	52	313.5	5.56	54	332.5	5.69
10.0	50	300.0	5.48	52	320.0	5.64	54	340.0	5.80	56	360.0	5.94
10.5	52	325.5	5.71	54	346.5	5.88	56	367.5	6.04	58	388.5	6.18
11	54	352	5.95	56	374	6.11	58	396	6.27	60	418	6.42
12	58	408	6.41	60	432	6.58	62	456	6.74	64	480	6.89
13	62	468	6.87	64	494	7.04	66	520	7.22	68	546	7.37

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 2 to 1—Continued.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	22.0	20.00	.89	24.0	22.00	.90	26.0	24.00	.91	28.0	26.00	.91
1.2	22.8	24.48	1.05	24.8	26.88	1.06	26.8	29.28	1.07	28.8	31.68	1.08
1.4	23.6	29.12	1.20	25.6	31.92	1.22	27.6	34.72	1.23	29.6	37.52	1.24
1.6	24.4	33.92	1.35	26.4	37.12	1.37	28.4	40.32	1.38	30.4	43.52	1.40
1.8	25.2	38.88	1.49	27.2	42.48	1.51	29.2	46.08	1.53	31.2	49.68	1.55
2.0	26.0	44.00	1.63	28.0	48.00	1.66	30.0	52.00	1.68	32.0	56.00	1.70
2.2	26.8	49.28	1.77	28.8	53.68	1.80	30.8	58.08	1.82	32.8	62.48	1.85
2.4	27.6	54.72	1.90	29.6	59.52	1.94	31.6	64.32	1.96	33.6	69.12	1.99
2.6	28.4	60.32	2.04	30.4	65.52	2.07	32.4	70.72	2.10	34.4	75.92	2.13
2.8	29.2	66.08	2.17	31.2	71.68	2.20	33.2	77.28	2.24	35.2	82.88	2.27
3.0	30.0	72.00	2.29	32.0	78.00	2.34	34.0	84.00	2.37	36.0	90.00	2.41
3.2	30.8	78.08	2.42	32.8	84.48	2.46	34.8	90.88	2.50	36.8	97.28	2.54
3.4	31.6	84.32	2.54	33.6	91.12	2.59	35.6	97.92	2.63	37.6	104.72	2.67
3.6	32.4	90.72	2.66	34.4	97.92	2.71	36.4	105.12	2.76	38.4	112.32	2.80
3.8	33.2	97.28	2.78	35.2	104.88	2.84	37.2	112.48	2.89	39.2	120.08	2.93
4.0	34.0	104.00	2.90	36.0	112.00	2.96	38.0	120.00	3.01	40.0	128.00	3.06
4.2	34.8	110.88	3.02	36.8	119.28	3.08	38.8	127.68	3.13	40.8	136.08	3.18
4.4	35.6	117.92	3.13	37.6	126.72	3.19	39.6	135.52	3.25	41.6	144.32	3.30
4.6	36.4	125.12	3.24	38.4	134.32	3.31	40.4	143.52	3.37	42.4	152.72	3.43
4.8	37.2	132.48	3.36	39.2	142.08	3.43	41.2	151.68	3.49	43.2	161.28	3.55
5.0	38.0	140.00	3.47	40.0	150.00	3.54	42.0	160.00	3.61	44.0	170.00	3.67
5.2	38.8	147.68	3.58	40.8	158.08	3.65	42.8	168.48	3.72	44.8	178.88	3.78
5.4	39.6	155.52	3.69	41.6	166.32	3.77	43.6	177.12	3.84	45.6	187.92	3.90
5.6	40.4	163.52	3.80	42.4	174.72	3.88	44.4	185.92	3.95	46.4	197.12	4.02
5.8	41.2	171.68	3.91	43.2	183.28	3.99	45.2	194.88	4.06	47.2	206.48	4.13
6.0	42.0	180.00	4.02	44.0	192.00	4.10	46.0	204.00	4.18	48.0	216.00	4.25
6.2	42.8	188.48	4.12	44.8	200.88	4.21	46.8	213.28	4.29	48.8	225.68	4.36
6.4	43.6	197.12	4.23	45.6	209.92	4.32	47.6	222.72	4.40	49.6	235.52	4.48
6.6	44.4	205.92	4.33	46.4	219.12	4.43	48.4	232.32	4.51	50.4	245.52	4.59
6.8	45.2	214.88	4.43	47.2	228.48	4.53	49.2	242.08	4.62	51.2	255.68	4.70
7.0	46	224.0	4.54	48	238.0	4.64	50	252.0	4.73	52	266.0	4.81
7.5	48	247.5	4.80	50	262.5	4.90	52	277.5	5.00	54	292.5	5.08
8.0	50	272.0	5.05	52	288.0	5.16	54	304.0	5.26	56	320.0	5.35
8.5	52	297.5	5.31	54	314.5	5.42	56	331.5	5.52	58	348.5	5.62
9.0	54	324.0	5.56	56	342.0	5.68	58	360.0	5.78	60	378.0	5.88
9.5	56	351.5	5.81	58	370.5	5.93	60	389.5	6.04	62	408.5	6.14
10.0	58	380.0	6.06	60	400.0	6.18	62	420.0	6.30	64	440.0	6.40
10.5	60	409.5	6.30	62	430.5	6.43	64	451.5	6.55	66	472.5	6.66
11	62	440	6.54	64	462	6.67	66	484	6.80	68	506	6.91
12	66	504	7.03	68	528	7.16	70	552	7.30	72	576	7.42
13	70	572	7.51	72	598	7.65	74	624	7.79	76	650	7.91

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

side slopes 2 to 1—Continued.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$
1.0	30.0	28.00	.92	32.0	30.00	.92	34.0	32.00	.93	36.0	34.00	.93
1.2	30.8	34.08	1.09	32.8	36.48	1.09	34.8	38.88	1.10	36.8	41.28	1.10
1.4	31.6	40.32	1.25	33.6	43.12	1.26	35.6	45.92	1.27	37.6	48.72	1.27
1.6	32.4	46.72	1.41	34.4	49.92	1.42	36.4	53.12	1.43	38.4	56.32	1.44
1.8	33.2	53.28	1.56	35.2	56.88	1.58	37.2	60.48	1.59	39.2	64.08	1.60
2.0	34.0	60.00	1.72	36.0	64.00	1.73	38.0	68.00	1.75	40.0	72.00	1.76
2.2	34.8	66.88	1.87	36.8	71.28	1.88	38.8	75.68	1.90	40.8	80.08	1.91
2.4	35.6	73.92	2.01	37.6	78.72	2.03	39.6	83.52	2.05	41.6	88.32	2.07
2.6	36.4	81.12	2.16	38.4	86.32	2.18	40.4	91.52	2.20	42.4	96.72	2.22
2.8	37.2	88.48	2.30	39.2	94.08	2.32	41.2	99.68	2.34	43.2	105.28	2.36
3.0	38.0	96.00	2.44	40.0	102.00	2.46	42.0	108.00	2.48	44.0	114.00	2.51
3.2	38.8	103.68	2.57	40.8	110.08	2.60	42.8	116.48	2.63	44.8	122.88	2.65
3.4	39.6	111.52	2.71	41.6	118.32	2.74	43.6	125.12	2.77	45.6	131.92	2.79
3.6	40.4	119.52	2.84	42.4	126.72	2.87	44.4	133.92	2.90	46.4	141.12	2.93
3.8	41.2	127.68	2.97	43.2	135.28	3.01	45.2	142.88	3.04	47.2	150.48	3.07
4.0	42.0	136.00	3.10	44.0	144.00	3.14	46.0	152.00	3.17	48.0	160.00	3.21
4.2	42.8	144.48	3.23	44.8	152.88	3.27	46.8	161.28	3.31	48.8	169.68	3.34
4.4	43.6	153.12	3.35	45.6	161.92	3.40	47.6	170.72	3.44	49.6	179.52	3.47
4.6	44.4	161.92	3.47	46.4	171.12	3.52	48.4	180.32	3.57	50.4	189.52	3.60
4.8	45.2	170.88	3.60	47.2	180.48	3.65	49.2	190.08	3.69	51.2	199.68	3.73
5.0	46.0	180.00	3.72	48.0	190.00	3.77	50.0	200.00	3.82	52.0	210.00	3.86
5.2	46.8	189.28	3.84	48.8	199.68	3.90	50.8	210.08	3.95	52.8	220.48	3.99
5.4	47.6	198.72	3.96	49.6	209.52	4.02	51.6	220.32	4.07	53.6	231.12	4.12
5.6	48.4	208.32	4.08	50.4	219.52	4.14	52.4	230.72	4.19	54.4	241.92	4.24
5.8	49.2	218.08	4.20	51.2	229.68	4.26	53.2	241.28	4.31	55.2	252.88	4.36
6.0	50.0	228.00	4.32	52.0	240.00	4.38	54.0	252.00	4.43	56.0	264.00	4.49
6.2	50.8	238.08	4.43	52.8	250.48	4.49	54.8	262.88	4.55	56.8	275.28	4.61
6.4	51.6	248.32	4.55	53.6	261.12	4.61	55.6	273.92	4.67	57.6	286.72	4.73
6.6	52.4	258.72	4.66	54.4	271.92	4.73	56.4	285.12	4.79	58.4	298.32	4.84
6.8	53.2	269.28	4.77	55.2	282.88	4.84	57.2	296.48	4.91	59.2	310.08	4.97
7.0	54	280.0	4.89	56	294.0	4.96	58	308.0	5.02	60	322.0	5.09
7.5	56	307.5	5.16	58	322.5	5.24	60	337.5	5.31	62	352.5	5.38
8.0	58	336.0	5.44	60	352.0	5.52	62	368.0	5.59	64	384.0	5.67
8.5	60	365.5	5.71	62	382.5	5.79	64	399.5	5.87	66	416.5	5.95
9.0	62	396.0	5.98	64	414.0	6.07	66	432.0	6.15	68	450.0	6.23
9.5	64	427.5	6.24	66	446.5	6.34	68	465.5	6.42	70	484.5	6.51
10.0	66	460.0	6.50	68	480.0	6.60	70	500.0	6.69	72	520.0	6.78
10.5	68	493.5	6.76	70	514.5	6.86	72	535.5	6.96	74	556.5	7.05
11	70	528	7.02	72	550	7.13	74	572	7.22	76	594	7.32
12	74	600	7.53	76	624	7.64	78	648	7.75	80	672	7.84
13	78	676	8.03	80	702	8.15	82	728	8.26	84	754	8.36

Table 18.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **side slopes 2 to 1**—Continued.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	39.0	37.00	.94	44.0	42.00	.94	49.0	47.00	.95	54.0	52.00	.95
1.2	39.8	44.88	1.11	44.8	50.88	1.12	49.8	56.88	1.13	54.8	62.88	1.14
1.4	40.6	52.92	1.28	45.6	59.92	1.30	50.6	66.92	1.31	55.6	73.92	1.31
1.6	41.4	61.12	1.45	46.4	69.12	1.47	51.4	77.12	1.48	56.4	85.12	1.49
1.8	42.2	69.48	1.61	47.2	78.48	1.63	52.2	87.48	1.65	57.2	96.48	1.66
2.0	43.0	78.00	1.77	48.0	88.00	1.80	53.0	98.00	1.82	58.0	108.00	1.83
2.2	43.8	86.68	1.96	48.8	97.68	1.96	53.8	108.68	1.98	58.8	119.68	2.00
2.4	44.6	95.52	2.09	49.6	107.52	2.12	54.6	119.52	2.14	59.6	131.52	2.17
2.6	45.4	104.52	2.24	50.4	117.52	2.28	55.4	130.52	2.30	60.4	143.52	2.33
2.8	46.2	113.68	2.39	51.2	127.68	2.43	56.2	141.68	2.46	61.2	155.68	2.49
3.0	47.0	123.00	2.54	52.0	138.00	2.58	57.0	153.00	2.62	62.0	168.00	2.65
3.2	47.8	132.48	2.69	52.8	148.48	2.73	57.8	164.48	2.77	62.8	180.48	2.81
3.4	48.6	142.12	2.83	53.6	159.12	2.88	58.6	176.12	2.93	63.6	193.12	2.96
3.6	49.4	151.92	2.97	54.4	169.92	3.03	59.4	187.92	3.08	64.4	205.92	3.12
3.8	50.2	161.88	3.11	55.2	180.88	3.17	60.2	199.88	3.22	65.2	218.88	3.27
4.0	51.0	172.00	3.25	56.0	192.00	3.32	61.0	212.00	3.37	66.0	232.00	3.42
4.2	51.8	182.28	3.39	56.8	203.28	3.46	61.8	224.28	3.52	66.8	245.28	3.57
4.4	52.6	192.72	3.52	57.6	214.72	3.60	62.6	236.72	3.66	67.6	258.72	3.71
4.6	53.4	203.32	3.66	58.4	226.32	3.74	63.4	249.32	3.80	68.4	272.32	3.86
4.8	54.2	214.08	3.79	59.2	238.08	3.87	64.2	262.08	3.94	69.2	286.08	4.00
5.0	55.0	225.00	3.92	60.0	250.00	4.01	65.0	275.00	4.08	70.0	300.00	4.15
5.2	55.8	236.08	4.05	60.8	262.08	4.14	65.8	288.08	4.22	70.8	314.08	4.29
5.4	56.6	247.32	4.18	61.6	274.32	4.28	66.6	301.32	4.36	71.6	328.32	4.43
5.6	57.4	258.72	4.31	62.4	286.72	4.41	67.4	314.72	4.49	72.4	342.72	4.57
5.8	58.2	270.28	4.43	63.2	299.28	4.54	68.2	328.28	4.63	73.2	357.28	4.71
6.0	59.0	282.00	4.56	64.0	312.00	4.67	69.0	342.00	4.76	74.0	372.00	4.85
6.2	59.8	293.88	4.69	64.8	324.88	4.80	69.8	355.88	4.89	74.8	386.88	4.98
6.4	60.6	305.92	4.81	65.6	337.92	4.92	70.6	369.92	5.02	75.6	401.92	5.11
6.6	61.4	318.12	4.98	66.4	351.12	5.05	71.4	384.12	5.16	76.4	417.12	5.25
6.8	62.2	330.48	5.06	67.2	364.48	5.18	72.2	398.48	5.28	77.2	432.48	5.38
7.0	63	343	5.17	68	378.0	5.30	73	413	5.41	78	448.0	5.51
7.5	65	375	5.47	70	412.5	5.61	75	450	5.73	80	487.5	5.84
8.0	67	408	5.76	72	448.0	5.91	77	488	6.04	82	528.0	6.16
8.5	69	442	6.05	74	484.5	6.21	79	527	6.35	84	569.5	6.47
9.0	71	477	6.34	76	522.0	6.51	81	567	6.65	86	612.0	6.78
9.5	73	513	6.62	78	560.5	6.80	83	608	6.95	88	655.5	7.09
10.0	75	550	6.90	80	600.0	7.09	85	650	7.24	90	700.0	7.40
10.5	77	588	7.18	82	640.5	7.37	87	693	7.53	92	745.5	7.69
11	79	627	7.45	84	682	7.65	89	737	7.82	94	792	7.98
12	83	708	7.98	88	768	8.21	93	828	8.39	98	888	8.56
13	87	793	8.52	92	858	8.75	97	923	8.96	102	988	9.14

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*
one side slope 1 to 1 and one side slope 1½ to 1.
(This table can also be used for both side slopes 1½:1.)

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.1	2.09	1.00	.20	4.00	1.45	.28	5.00	1.90	.34	6.00	2.29	.35
0.2	2.18	1.05	.42	4.30	2.25	.46	5.30	2.85	.48	6.30	3.45	.50
0.3	4.00	2.40	.58	5.00	3.20	.58	6.00	4.00	.61	7.00	4.80	.64
1.0	4.50	3.25	.62	5.50	4.25	.68	6.50	5.25	.73	7.50	6.25	.76
1.1	5.00	4.20	.72	6.00	5.40	.79	7.00	6.60	.84	8.00	7.80	.88
1.2	5.20	5.25	.81	6.50	6.65	.89	7.50	8.05	.95	8.50	9.45	1.00
1.3	6.00	6.40	.90	7.00	8.00	.98	8.00	9.60	1.05	9.00	11.20	1.10
1.4	6.20	7.65	.98	7.50	9.45	1.07	8.50	11.25	1.15	9.50	13.05	1.21
2.0	7.00	9.00	1.07	8.00	11.00	1.17	9.00	13.00	1.25	10.00	15.00	1.31
2.1	7.20	10.45	1.15	8.50	12.65	1.26	9.50	14.85	1.34	10.50	17.05	1.41
2.2	8.00	12.00	1.23	9.00	14.40	1.34	10.00	16.80	1.43	11.00	19.20	1.51
2.3	8.20	13.65	1.32	9.50	16.25	1.42	10.50	18.85	1.52	11.50	21.45	1.61
2.4	9.00	15.40	1.40	10.00	18.20	1.52	11.00	21.00	1.61	12.00	23.80	1.70
2.5	9.50	17.25	1.48	10.50	20.25	1.60	11.50	23.25	1.70	12.50	26.25	1.79
2.6	10.00	19.20	1.56	11.00	22.40	1.69	12.00	25.60	1.79	13.00	28.80	1.88
2.7	10.50	21.25	1.64	11.50	24.65	1.77	12.50	28.05	1.88	13.50	31.45	1.97
2.8	11.00	23.40	1.72	12.00	27.00	1.85	13.00	30.60	1.96	14.00	34.20	2.06
2.9	11.50	25.65	1.80	12.50	29.45	1.93	13.50	33.25	2.05	14.50	37.05	2.15
3.0	12.00	28.00	1.88	13.00	32.00	2.02	14.00	36.00	2.13	15.00	40.00	2.24
3.1	12.50	30.45	1.96	13.50	34.65	2.10	14.50	38.85	2.22	15.50	43.05	2.33
3.2	13.00	33.00	2.04	14.00	37.40	2.18	15.00	41.80	2.30	16.00	46.20	2.41
3.3	13.50	35.65	2.12	14.50	40.25	2.26	15.50	44.85	2.39	16.50	49.45	2.50
3.4	14.00	38.40	2.20	15.00	43.20	2.34	16.00	48.00	2.47	17.00	52.80	2.58
3.5	14.50	41.25	2.28	15.50	46.25	2.42	16.50	51.25	2.55	17.50	56.25	2.67
3.6	15.00	44.20	2.36	16.00	49.40	2.50	17.00	54.60	2.63	18.00	59.80	2.75
3.7	15.50	47.25	2.44	16.50	52.65	2.58	17.50	58.05	2.71	18.50	63.45	2.83
3.8	16.00	50.40	2.52	17.00	56.00	2.66	18.00	61.60	2.80	19.00	67.20	2.92
3.9	16.50	53.65	2.59	17.50	59.45	2.74	18.50	65.25	2.88	19.50	71.05	3.00
4.0	17.00	57.00	2.68	18.00	63.00	2.83	19.00	69.00	2.96	20.00	75.00	3.09
4.1	17.50	60.45	2.75	18.50	66.65	2.90	19.50	72.85	3.04	20.50	79.05	3.17
4.2	18.00	64.00	2.83	19.00	70.40	2.98	20.00	76.80	3.12	21.00	83.20	3.25
4.3	18.50	67.65	2.91	19.50	74.25	3.06	20.50	80.85	3.20	21.50	87.45	3.33
4.4	19.00	71.40	2.99	20.00	78.20	3.14	21.00	85.00	3.28	22.00	91.80	3.41
4.5	.....	.....	.....	20.50	82.25	3.22	21.50	89.25	3.37	22.50	96.25	3.50
4.6	.....	.....	.....	21.75	92.81	3.42	22.75	100.81	3.57	23.75	107.81	3.70
4.7	.....	.....	.....	23.00	104 00	3.62	24.00	112.00	3.77	25.00	120.00	3.90
4.8	.....	.....	.....	24.25	115.81	3.82	25.25	124.81	3.97	26.25	132.81	4.11
4.9	.....	.....	.....	25.50	128.25	4.01	26.50	137.25	4.17	27.50	146.25	4.31
5.0	.....	.....	.....	.....	.....	.....	27.75	150.81	4.36	28.75	160.81	4.51
10	.....	.....	.....	.....	.....	.....	29.00	165.00	4.56	30.00	175.00	4.71
11	.....	.....	.....	.....	.....	.....	31.50	195.25	4.96	32.50	206.25	5.11

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 1 to 1 and one side slope 1½ to 1**—Con.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	7.00	2.80	.36	8.00	3.00	.36	9.00	3.40	.37	10.00	3.80	.37
0.6	7.50	4.05	.51	8.50	4.65	.52	9.50	5.25	.53	10.50	5.85	.54
0.8	8.00	5.60	.65	9.00	6.40	.67	10.00	7.20	.68	11.00	8.00	.69
1.0	8.50	7.25	.79	9.50	8.25	.81	10.50	9.25	.82	11.50	10.25	.84
1.2	9.00	9.00	.91	10.00	10.20	.94	11.00	11.40	.96	12.00	12.60	.98
1.4	9.50	10.85	1.03	10.50	12.25	1.06	11.50	13.65	1.09	12.50	15.05	1.11
1.6	10.00	12.80	1.15	11.00	14.40	1.19	12.00	16.00	1.22	13.00	17.60	1.24
1.8	10.50	14.85	1.26	11.50	16.65	1.30	12.50	18.45	1.34	13.50	20.25	1.37
2.0	11.00	17.00	1.37	12.00	19.00	1.41	13.00	21.00	1.45	14.00	23.00	1.49
2.2	11.50	19.25	1.47	12.50	21.45	1.52	13.50	23.65	1.57	14.50	25.85	1.61
2.4	12.00	21.60	1.57	13.00	24.00	1.63	14.00	26.40	1.68	15.00	28.80	1.72
2.6	12.50	24.05	1.67	13.50	26.65	1.73	14.50	29.25	1.79	15.50	31.85	1.83
2.8	13.00	26.60	1.77	14.00	29.40	1.84	15.00	32.20	1.89	16.00	35.00	1.94
3.0	13.50	29.25	1.87	14.50	32.25	1.94	15.50	35.25	2.00	16.50	38.25	2.05
3.2	14.00	32.00	1.96	15.00	35.20	2.04	16.00	38.40	2.10	17.00	41.60	2.16
3.4	14.50	34.85	2.06	15.50	38.25	2.13	16.50	41.65	2.20	17.50	45.05	2.26
3.6	15.00	37.80	2.15	16.00	41.40	2.23	17.00	45.00	2.30	18.00	48.60	2.36
3.8	15.50	40.85	2.24	16.50	44.65	2.32	17.50	48.45	2.40	18.50	52.25	2.46
4.0	16.00	44.00	2.33	17.00	48.00	2.42	18.00	52.00	2.49	19.00	56.00	2.56
4.2	16.50	47.25	2.42	17.50	51.45	2.51	18.50	55.65	2.59	19.50	59.85	2.66
4.4	17.00	50.60	2.51	18.00	55.00	2.60	19.00	59.40	2.68	20.00	63.80	2.76
4.6	17.50	54.05	2.60	18.50	58.65	2.69	19.50	63.25	2.77	20.50	67.85	2.85
4.8	18.00	57.60	2.69	19.00	62.40	2.78	20.00	67.20	2.87	21.00	72.00	2.96
5.0	18.50	61.25	2.77	19.50	66.25	2.87	20.50	71.25	2.95	21.50	76.25	3.04
5.2	19.00	65.00	2.86	20.00	70.20	2.96	21.00	75.40	3.05	22.00	80.60	3.13
5.4	19.50	68.85	2.94	20.50	74.25	3.04	21.50	79.65	3.14	22.50	85.05	3.23
5.6	20.00	72.80	3.03	21.00	78.40	3.13	22.00	84.00	3.23	23.00	89.60	3.32
5.8	20.50	76.85	3.11	21.50	82.65	3.22	22.50	88.45	3.31	23.50	94.25	3.40
6.0	21.00	81.00	3.20	22.00	87.00	3.31	23.00	93.00	3.41	24.00	99.00	3.50
6.2	21.50	85.25	3.28	22.50	91.45	3.39	23.50	97.65	3.49	24.50	103.85	3.59
6.4	22.00	89.60	3.36	23.00	96.00	3.47	24.00	102.40	3.58	25.00	108.80	3.68
6.6	22.50	94.05	3.45	23.50	100.65	3.56	24.50	107.25	3.67	25.50	113.85	3.76
6.8	23.00	98.60	3.53	24.00	105.40	3.65	25.00	112.20	3.75	26.00	119.00	3.85
7.0	23.50	103.25	3.62	24.50	110.25	3.74	25.50	117.25	3.84	26.50	124.25	3.94
7.5	24.75	115.31	3.83	25.75	122.81	3.95	26.75	130.31	4.06	27.75	137.81	4.16
8.0	26.00	128.00	4.03	27.00	136.00	4.15	28.00	144.00	4.27	29.00	152.00	4.38
8.5	27.25	141.31	4.24	28.25	149.81	4.36	29.25	158.31	4.48	30.25	166.81	4.59
9.0	28.50	155.25	4.44	29.50	164.25	4.57	30.50	173.25	4.69	31.50	182.25	4.80
9.5	29.75	169.81	4.64	30.75	179.31	4.77	31.75	188.81	4.90	32.75	198.31	5.01
10	31.00	185.00	4.85	32.00	195.00	4.98	33.00	205.00	5.10	34.00	215.00	5.22
11	33.50	217.25	5.25	34.50	228.25	5.35	35.50	239.25	5.51	36.50	250.25	5.64

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 1 to 1 and one side slope 1½ to 1**—Con.

Depth	Bottom width 10 feet.			Bottom width 12 feet			Bottom width 14 feet			Bottom width 16 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	12.50	11.25	.85	14.50	13.25	.87	16.50	15.25	.89	18.50	17.25	.90
1.2	13.00	13.80	1.00	15.00	16.20	1.02	17.00	18.60	1.04	19.00	21.00	1.06
1.4	13.50	16.45	1.13	15.50	19.25	1.17	17.50	22.05	1.19	19.50	24.85	1.21
1.6	14.00	19.20	1.27	16.00	22.40	1.31	18.00	25.60	1.34	20.00	28.80	1.36
1.8	14.50	22.05	1.40	16.50	25.65	1.44	18.50	29.25	1.48	20.50	32.85	1.51
2.0	15.00	25.00	1.52	17.00	29.00	1.57	19.00	33.00	1.61	21.00	37.00	1.65
2.2	15.50	28.05	1.64	17.50	32.45	1.70	19.50	36.85	1.75	21.50	41.25	1.79
2.4	16.00	31.20	1.76	18.00	36.00	1.83	20.00	40.80	1.88	22.00	45.60	1.92
2.6	16.50	34.45	1.88	18.50	39.65	1.95	20.50	44.85	2.01	22.50	50.05	2.05
2.8	17.00	37.80	1.99	19.00	43.40	2.07	21.00	49.00	2.13	23.00	54.60	2.18
3.0	17.50	41.25	2.10	19.50	47.25	2.18	21.50	53.25	2.25	23.50	59.25	2.30
3.2	18.00	44.80	2.21	20.00	51.20	2.30	22.00	57.60	2.37	24.00	64.00	2.43
3.4	18.50	48.45	2.31	20.50	55.25	2.41	22.50	62.05	2.49	24.50	68.85	2.56
3.6	19.00	52.20	2.42	21.00	59.40	2.52	23.00	66.60	2.60	25.00	73.80	2.68
3.8	19.50	56.05	2.52	21.50	63.65	2.63	23.50	71.25	2.72	25.50	78.85	2.79
4.0	20.00	60.00	2.62	22.00	68.00	2.73	24.00	76.00	2.83	26.00	84.00	2.91
4.2	20.50	64.05	2.72	22.50	72.45	2.84	24.50	80.85	2.94	26.50	89.25	3.02
4.4	21.00	68.20	2.82	23.00	77.00	2.94	25.00	85.80	3.05	27.00	94.60	3.14
4.6	21.50	72.45	2.92	23.50	81.65	3.05	25.50	90.85	3.15	27.50	100.05	3.25
4.8	22.00	76.80	3.02	24.00	86.40	3.15	26.00	96.00	3.26	28.00	105.60	3.36
5.0	22.50	81.25	3.11	24.50	91.25	3.24	26.50	101.25	3.37	28.50	111.25	3.47
5.2	23.00	85.80	3.21	25.00	96.20	3.34	27.00	106.60	3.47	29.00	117.00	3.57
5.4	23.50	90.45	3.30	25.50	101.25	3.44	27.50	112.05	3.57	29.50	122.85	3.68
5.6	24.00	95.20	3.39	26.00	106.40	3.54	28.00	117.60	3.67	30.00	128.80	3.78
5.8	24.50	100.05	3.49	26.50	111.65	3.64	28.50	123.25	3.77	30.50	134.85	3.89
6.0	25.00	105.00	3.58	27.00	117.00	3.74	29.00	129.00	3.88	31.00	141.00	3.99
6.2	25.50	110.05	3.67	27.50	122.45	3.83	29.50	134.85	3.97	31.50	147.25	4.10
6.4	26.00	115.20	3.76	28.00	128.00	3.92	30.00	140.80	4.07	32.00	153.60	4.20
6.6	26.50	120.45	3.85	28.50	133.65	4.02	30.50	146.85	4.17	32.50	160.05	4.30
6.8	27.00	125.80	3.94	29.00	139.40	4.11	31.00	153.00	4.21	33.00	166.60	4.40
7.0	27.50	131.25	4.04	29.50	145.25	4.21	31.50	159.25	4.36	33.50	173.25	4.49
7.5	28.75	145.31	4.26	30.75	160.31	4.44	32.75	175.31	4.60	34.75	190.31	4.74
8.0	30.00	160.00	4.48	32.00	176.00	4.66	34.00	192.00	4.83	36.00	208.00	4.98
8.5	31.25	175.31	4.70	33.25	192.31	4.89	35.25	209.31	5.06	37.25	226.31	5.22
9.0	32.50	191.25	4.91	34.50	209.25	5.11	36.50	227.25	5.29	38.50	245.25	5.46
9.5	33.75	207.81	5.13	35.75	226.81	5.33	37.75	245.81	5.51	39.75	264.81	5.69
10.0	35.00	225.00	5.34	37.00	245.00	5.55	39.00	265.00	5.74	41.00	285.00	5.92
10.5	36.25	242.81	5.55	38.25	263.81	5.77	40.25	284.81	5.96	42.25	305.81	6.15
11	37.5	261.25	5.76	39.5	283.25	5.98	41.5	305.25	6.18	43.5	327.25	6.37
12	40.0	300.00	6.17	42.0	324.00	6.41	44.0	348.00	6.62	46.0	372.00	6.82
13	42.5	341.25	6.59	44.5	367.25	6.82	46.5	393.25	7.05	48.5	419.25	7.25

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

one side slope 1 to 1 and one side slope 1½ to 1—Con.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$	T	A	$\frac{\text{area}}{\text{wet per.}}=r$
1.0	20.50	19.25	.91	22.50	21.25	.92	24.50	23.25	.92	26.50	25.25	.93
1.2	21.00	23.40	1.07	23.00	25.80	1.08	25.00	28.20	1.09	27.00	30.60	1.10
1.4	21.50	27.65	1.23	23.50	30.45	1.24	25.50	33.25	1.25	27.50	36.05	1.26
1.6	22.00	32.00	1.38	24.00	35.20	1.40	26.00	38.40	1.41	28.00	41.60	1.43
1.8	22.50	36.45	1.53	24.50	40.05	1.55	26.50	43.65	1.57	28.50	47.25	1.59
2.0	23.00	41.00	1.68	25.00	45.00	1.70	27.00	49.00	1.72	29.00	53.00	1.74
2.2	23.50	45.65	1.82	25.50	50.05	1.85	27.50	54.45	1.87	29.50	58.85	1.89
2.4	24.00	50.40	1.96	26.00	55.20	1.99	28.00	60.00	2.02	30.00	64.80	2.04
2.6	24.50	55.25	2.10	26.50	60.45	2.13	28.50	65.65	2.16	30.50	70.85	2.19
2.8	25.00	60.20	2.23	27.00	65.80	2.27	29.00	71.40	2.30	31.00	77.00	2.33
3.0	25.50	65.25	2.36	27.50	71.25	2.40	29.50	77.25	2.44	31.50	83.25	2.47
3.2	26.00	70.40	2.49	28.00	76.80	2.54	30.00	83.20	2.58	32.00	89.60	2.61
3.4	26.50	75.65	2.61	28.50	82.45	2.66	30.50	89.25	2.71	32.50	96.05	2.75
3.6	27.00	81.00	2.74	29.00	88.20	2.79	31.00	95.40	2.84	33.00	102.60	2.88
3.8	27.50	86.45	2.86	29.50	94.05	2.92	31.50	101.65	2.97	33.50	109.25	3.02
4.0	28.00	92.00	2.98	30.00	100.00	3.04	32.00	108.00	3.10	34.00	116.00	3.15
4.2	28.50	97.65	3.10	30.50	106.05	3.16	32.50	114.45	3.22	34.50	122.85	3.28
4.4	29.00	103.40	3.22	31.00	112.20	3.29	33.00	121.00	3.35	35.00	129.80	3.40
4.6	29.50	109.25	3.33	31.50	118.45	3.40	33.50	127.65	3.47	35.50	136.85	3.53
4.8	30.00	115.20	3.44	32.00	124.80	3.52	34.00	134.40	3.59	36.00	144.00	3.65
5.0	30.50	121.25	3.56	32.50	131.25	3.64	34.50	141.25	3.71	36.50	151.25	3.77
5.2	31.00	127.40	3.67	33.00	137.80	3.75	35.00	148.20	3.83	37.00	158.60	3.89
5.4	31.50	133.65	3.78	33.50	144.45	3.86	35.50	155.25	3.94	37.50	166.05	4.01
5.6	32.00	140.00	3.89	34.00	151.20	3.98	36.00	162.40	4.06	38.00	173.60	4.13
5.8	32.50	146.45	3.99	34.50	158.05	4.06	36.50	169.65	4.17	38.50	181.25	4.25
6.0	33.00	153.00	4.10	35.00	165.00	4.20	37.00	177.00	4.29	39.00	189.00	4.37
6.2	33.50	159.65	4.20	35.50	172.05	4.31	37.50	184.45	4.40	39.50	196.85	4.48
6.4	34.00	166.40	4.31	36.00	179.20	4.41	38.00	192.00	4.51	40.00	204.80	4.59
6.6	34.50	173.25	4.41	36.50	186.45	4.52	38.50	199.65	4.62	40.50	212.85	4.71
6.8	35.00	180.20	4.52	37.00	193.80	4.63	39.00	207.40	4.73	41.00	221.00	4.82
7.0	35.50	187.25	4.62	37.50	201.25	4.73	39.50	215.25	4.83	41.50	229.25	4.93
7.5	36.75	205.31	4.87	38.75	220.31	4.98	40.75	235.31	5.10	42.75	250.31	5.20
8.0	38.00	224.00	5.12	40.00	240.00	5.24	42.00	256.00	5.36	44.00	272.00	5.47
8.5	39.25	243.31	5.37	41.25	260.31	5.49	43.25	277.31	5.62	45.25	294.31	5.73
9.0	40.50	263.25	5.61	42.50	281.25	5.74	44.50	299.25	5.87	46.50	317.25	5.99
9.5	41.75	283.81	5.85	43.75	302.81	5.99	45.75	321.81	6.12	47.75	340.81	6.25
10.0	43.00	305.00	6.08	45.00	325.00	6.23	47.00	345.00	6.37	49.00	365.00	6.50
10.5	44.25	326.81	6.31	46.25	347.81	6.46	48.25	368.81	6.61	50.25	389.81	6.75
11	45.5	349.25	6.54	47.5	371.25	6.70	49.5	393.25	6.85	51.5	415.25	6.99
12	48.0	396.00	7.00	50.0	420.00	7.17	52.0	444.00	7.38	54.0	468.00	7.48
13	50.5	445.00	7.44	52.5	471.25	7.62	54.5	497.25	7.79	56.5	523.25	7.96

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

one side slope 1 to 1 and one side slope 1½ to 1—Con.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	A	area / wet. per.	T	A	area / wet. per.	T	A	area / wet. per.	T	A	area / wet. per.
1.0	28.50	27.25	.93	30.50	29.25	.94	32.50	31.25	.94	34.50	33.25	.94
1.2	29.00	33.00	1.10	31.00	35.40	1.11	33.00	37.80	1.12	35.00	40.20	1.12
1.4	29.50	38.85	1.27	31.50	41.65	1.28	33.50	44.45	1.29	35.50	47.25	1.29
1.6	30.00	44.80	1.44	32.00	48.00	1.45	34.00	51.20	1.46	36.00	54.40	1.46
1.8	30.50	50.85	1.60	32.50	54.45	1.61	34.50	58.05	1.62	36.50	61.65	1.63
2.0	31.00	57.00	1.76	33.00	61.00	1.77	35.00	65.00	1.78	37.00	69.00	1.80
2.2	31.50	63.25	1.91	33.50	67.65	1.93	35.50	72.05	1.94	37.50	76.45	1.96
2.4	32.00	69.60	2.06	34.00	74.40	2.08	36.00	79.20	2.10	38.00	84.00	2.11
2.6	32.50	76.05	2.21	34.50	81.25	2.23	36.50	86.45	2.25	38.50	91.65	2.27
2.8	33.00	82.60	2.36	35.00	88.20	2.38	37.00	93.80	2.40	39.00	99.40	2.42
3.0	33.50	89.25	2.50	35.50	95.25	2.53	37.50	101.25	2.55	39.50	107.25	2.57
3.2	34.00	96.00	2.64	36.00	102.40	2.68	38.00	108.80	2.70	40.00	115.20	2.72
3.4	34.50	102.85	2.78	36.50	109.65	2.82	38.50	116.45	2.84	40.50	123.25	2.87
3.6	35.00	109.80	2.92	37.00	117.00	2.96	39.00	124.20	2.99	41.00	131.40	3.02
3.8	35.50	116.85	3.05	37.50	124.45	3.09	39.50	132.05	3.13	41.50	139.65	3.16
4.0	36.00	124.00	3.19	38.00	132.00	3.23	40.00	140.00	3.27	42.00	148.00	3.30
4.2	36.50	131.25	3.32	38.50	139.65	3.36	40.50	148.05	3.40	42.50	156.45	3.44
4.4	37.00	138.60	3.45	39.00	147.40	3.50	41.00	156.20	3.54	43.00	165.00	3.58
4.6	37.50	146.05	3.58	39.50	155.25	3.63	41.50	164.45	3.67	43.50	173.65	3.71
4.8	38.00	153.60	3.71	40.00	163.20	3.76	42.00	172.80	3.80	44.00	182.40	3.84
5.0	38.50	161.25	3.85	40.50	171.25	3.89	42.50	181.25	3.93	44.50	191.25	3.98
5.2	39.00	169.00	3.98	41.00	179.40	4.01	43.00	189.80	4.06	45.00	200.20	4.11
5.4	39.50	176.85	4.08	41.50	187.65	4.14	43.50	198.45	4.19	45.50	209.25	4.24
5.6	40.00	184.80	4.20	42.00	196.00	4.26	44.00	207.20	4.31	46.00	218.40	4.37
5.8	40.50	192.85	4.32	42.50	204.45	4.38	44.50	216.05	4.44	46.50	227.65	4.49
6.0	41.00	201.00	4.44	43.00	213.00	4.50	45.00	225.00	4.56	47.00	237.00	4.62
6.2	41.50	209.25	4.55	43.50	221.65	4.62	45.50	234.05	4.68	47.50	246.45	4.74
6.4	42.00	217.60	4.67	44.00	230.40	4.74	46.00	243.20	4.80	48.00	256.00	4.87
6.6	42.50	226.05	4.79	44.50	239.25	4.86	46.50	252.45	4.92	48.50	265.65	4.99
6.8	43.00	234.60	4.90	45.00	248.20	4.98	47.00	261.80	5.04	49.00	275.40	5.11
7.0	43.50	243.25	5.01	45.50	257.25	5.09	47.50	271.25	5.16	49.50	285.25	5.23
7.5	44.75	265.81	5.29	46.75	280.31	5.36	48.75	295.31	5.45	50.75	310.31	5.53
8.0	46.00	288.00	5.57	48.00	304.00	5.65	50.00	320.00	5.74	52.00	336.00	5.82
8.5	47.25	311.81	5.84	49.25	328.81	5.93	51.25	345.81	6.02	53.25	362.81	6.11
9.0	48.50	336.25	6.12	50.50	353.25	6.20	52.50	371.25	6.30	54.50	390.25	6.39
9.5	49.75	360.81	6.36	51.75	378.81	6.47	53.75	397.81	6.57	55.75	416.81	6.66
10.0	51.00	385.00	6.63	53.00	405.00	6.73	55.00	425.00	6.84	57.00	445.00	6.93
10.5	52.25	410.81	6.87	54.25	431.81	6.99	56.25	452.81	7.10	58.25	473.81	7.20
11	53.5	437.25	7.12	55.5	459.25	7.25	57.5	481.25	7.36	59.5	503.25	7.47
12	56.0	492.00	7.60	58.0	516.00	7.73	60.0	540.00	7.87	62.0	564.00	7.98
13	58.5	549.25	8.10	60.5	575.25	8.24	62.5	601.25	8.37	64.5	627.25	8.49

Table 19.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

one side slope 1 to 1 and one side slope 1½ to 1—Con.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	37.50	36.25	.96	42.50	41.25	.96	47.50	46.25	.96	52.50	51.25	.96
1.2	38.90	43.80	1.13	43.90	43.80	1.14	48.90	53.80	1.14	53.90	53.80	1.15
1.4	39.30	51.45	1.30	43.50	58.45	1.31	48.50	65.45	1.32	53.50	72.45	1.33
1.6	39.20	59.20	1.47	44.00	67.20	1.49	48.80	75.20	1.50	54.00	83.20	1.51
1.8	39.50	67.05	1.64	44.50	76.05	1.66	49.50	85.05	1.67	54.50	94.05	1.69
2.0	40.00	75.00	1.81	45.00	85.00	1.83	50.00	95.00	1.85	55.00	105.00	1.86
2.2	40.50	83.05	1.97	45.50	94.05	2.00	50.50	105.05	2.02	55.50	116.05	2.03
2.4	41.00	91.20	2.13	46.00	103.20	2.16	51.00	115.20	2.19	56.00	127.20	2.20
2.6	41.50	99.45	2.29	46.50	112.45	2.33	51.50	125.45	2.35	56.50	138.45	2.37
2.8	42.00	107.80	2.45	47.00	121.80	2.49	52.00	135.80	2.51	57.00	149.80	2.54
3.0	42.50	116.25	2.61	47.50	131.25	2.65	52.50	146.25	2.68	57.50	162.25	2.70
3.2	43.00	124.80	2.76	48.00	140.80	2.80	53.00	156.80	2.84	58.00	173.80	2.85
3.4	43.50	133.45	2.90	48.50	150.45	2.95	53.50	167.45	2.99	58.50	184.45	3.03
3.6	44.00	142.20	3.05	49.00	160.20	3.11	54.00	178.20	3.15	59.00	196.20	3.18
3.8	44.50	151.05	3.20	49.50	170.05	3.26	54.50	189.05	3.30	59.50	208.05	3.34
4.0	45.00	160.00	3.34	50.00	180.00	3.40	55.00	200.00	3.46	60.00	220.00	3.50
4.2	45.50	169.05	3.48	50.50	190.05	3.55	55.50	211.05	3.61	60.50	232.05	3.65
4.4	46.00	178.20	3.62	51.00	200.20	3.70	56.00	222.20	3.76	61.00	244.20	3.81
4.6	46.50	187.45	3.76	51.50	210.45	3.84	56.50	233.45	3.90	61.50	256.45	3.96
4.8	47.00	196.80	3.90	52.00	220.80	3.98	57.00	244.80	4.05	62.00	268.80	4.11
5.0	47.50	206.25	4.04	52.50	231.25	4.13	57.50	256.25	4.20	62.50	281.25	4.26
5.2	48.00	215.80	4.17	53.00	241.80	4.26	58.00	267.80	4.34	63.00	293.80	4.40
5.4	48.50	225.45	4.30	53.50	252.45	4.40	58.50	279.45	4.48	63.50	306.45	4.55
5.6	49.00	235.20	4.43	54.00	263.20	4.53	59.00	291.20	4.62	64.00	319.20	4.69
5.8	49.50	245.05	4.56	54.50	274.05	4.67	59.50	303.05	4.76	64.50	332.05	4.83
6.0	50.00	255.00	4.70	55.00	285.00	4.81	60.00	315.00	4.90	65.00	345.00	4.96
6.2	50.50	265.05	4.82	55.50	296.05	4.94	60.50	327.05	5.04	65.50	358.05	5.13
6.4	51.00	275.20	4.95	56.00	307.20	5.07	61.00	339.20	5.17	66.00	371.20	5.26
6.6	51.50	285.45	5.07	56.50	318.45	5.20	61.50	351.45	5.30	66.50	384.45	5.40
6.8	52.00	295.80	5.20	57.00	329.80	5.33	62.00	363.80	5.44	67.00	397.80	5.53
7.0	52.50	306.25	5.32	57.50	342.25	5.45	62.50	376.25	5.57	67.50	411.25	5.67
7.5	53.75	332.81	5.62	58.75	370.31	5.77	63.75	407.81	5.90	68.75	445.31	6.01
8.0	55.00	362.80	5.92	60.00	400.00	6.08	65.00	440.00	6.22	70.00	480.00	6.34
8.5	56.25	397.81	6.22	61.25	430.31	6.39	66.25	472.81	6.54	71.25	515.31	6.66
9.0	57.50	416.25	6.51	62.50	461.25	6.69	67.50	506.25	6.85	72.50	551.25	6.98
9.5	58.75	445.31	6.79	63.75	492.81	6.98	68.75	540.31	7.15	73.75	587.81	7.30
10.0	60.00	475.00	7.07	65.00	525.00	7.27	70.00	575.00	7.45	75.00	625.00	7.61
10.5	61.25	505.31	7.35	66.25	557.81	7.56	71.25	610.31	7.75	76.25	662.81	7.91
11	62.5	536.25	7.62	67.5	591.25	7.84	72.5	646.25	8.04	77.5	701.25	8.21
12	65.0	600.00	8.15	70.0	660.00	8.40	75.0	720.00	8.61	80.0	780.00	8.80
13	67.5	666.25	8.67	72.5	733.25	8.94	77.5	798.25	9.17	82.5	863.25	9.39

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 2 to 1 and one side slope 1½ to 1.**

(This table can also be used for both slopes 1¼:1.)

Depth	Bottom width 2 feet			Bottom width 3 feet			Bottom width 4 feet			Bottom width 5 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	3.40	1.08	.30	4.40	1.48	.32	5.40	1.88	.33	6.40	2.28	.34
0.6	4.10	1.88	.41	5.10	2.43	.45	6.10	3.08	.47	7.10	3.68	.49
0.8	4.80	2.72	.52	5.80	3.52	.56	6.80	4.32	.60	7.80	5.12	.62
1.0	5.50	3.75	.62	6.50	4.75	.67	7.50	5.75	.72	8.50	6.75	.75
1.2	6.20	4.92	.72	7.20	6.12	.78	8.20	7.32	.86	9.20	8.52	.87
1.4	6.90	6.23	.81	7.90	7.63	.88	8.90	9.08	.94	9.90	10.48	.98
1.6	7.60	7.68	.91	8.60	9.28	.98	9.60	10.88	1.04	10.60	12.48	1.09
1.8	8.30	9.27	1.00	9.30	11.07	1.08	10.30	12.87	1.14	11.30	14.67	1.21
2.0	9.00	11.00	1.09	10.00	13.00	1.17	11.00	15.00	1.24	12.00	17.00	1.30
2.2	9.70	12.87	1.18	10.70	15.07	1.27	11.70	17.27	1.34	12.70	19.47	1.40
2.4	10.40	14.88	1.27	11.40	17.28	1.36	12.40	19.68	1.44	13.40	22.08	1.50
2.6	11.10	17.08	1.36	12.10	19.63	1.45	13.10	22.23	1.56	14.10	24.83	1.60
2.8	11.80	19.32	1.45	12.80	22.12	1.55	13.80	24.92	1.63	14.80	27.72	1.70
3.0	12.50	21.75	1.54	13.50	24.75	1.64	14.50	27.75	1.72	15.50	30.75	1.80
3.2	13.20	24.32	1.63	14.20	27.52	1.73	15.20	30.72	1.81	16.20	33.92	1.89
3.4	13.90	27.03	1.72	14.90	30.43	1.82	15.90	33.83	1.91	16.90	37.23	1.99
3.6	14.60	29.88	1.81	15.60	33.48	1.91	16.60	37.08	2.00	17.60	40.68	2.08
3.8	15.30	32.87	1.89	16.30	36.67	2.00	17.30	40.47	2.09	18.30	44.27	2.18
4.0	16.00	36.00	1.98	17.00	40.00	2.09	18.00	44.00	2.18	19.00	48.00	2.27
4.2	16.70	39.27	2.07	17.70	43.47	2.18	18.70	47.67	2.27	19.70	51.87	2.36
4.4	17.40	42.68	2.16	18.40	47.08	2.27	19.40	51.48	2.36	20.40	55.88	2.45
4.6	18.10	46.23	2.25	19.10	50.83	2.36	20.10	55.43	2.45	21.10	60.03	2.54
4.8	18.80	49.92	2.33	19.80	54.72	2.44	20.80	59.52	2.54	21.80	64.32	2.64
5.0	19.50	53.75	2.42	20.50	58.75	2.53	21.50	63.75	2.63	22.50	68.75	2.73
5.2	20.20	57.72	2.52	21.20	62.92	2.62	22.20	68.12	2.72	23.20	73.32	2.82
5.4	20.90	61.83	2.61	21.90	67.23	2.71	22.90	72.63	2.81	23.90	78.03	2.91
5.6	21.60	66.08	2.68	22.60	71.68	2.80	23.60	77.28	2.90	24.60	82.88	3.00
5.8	22.30	70.47	2.77	23.30	76.27	2.88	24.30	82.07	2.99	25.30	87.87	3.09
6.0	23.00	75.00	2.86	24.00	81.00	2.97	25.00	87.00	3.08	26.00	93.00	3.18
6.2	23.70	79.47	2.94	24.70	85.67	3.05	25.70	91.87	3.16	26.70	98.07	3.26
6.4	24.40	84.48	3.03	25.40	90.88	3.15	26.40	97.28	3.26	27.40	103.68	3.36
6.6	25.10	89.43	3.11	26.10	96.03	3.24	27.10	102.63	3.35	28.10	109.23	3.45
6.8	25.80	94.52	3.20	26.80	101.32	3.32	27.80	108.12	3.44	28.80	114.92	3.54
7.0	26.50	99.75	3.29	27.50	106.75	3.41	28.50	113.75	3.52	29.50	120.75	3.63
7.5	28.25	113.44	3.51	29.25	120.94	3.63	30.25	128.44	3.74	31.25	135.94	3.85
8.0	30.00	128.00	3.73	31.00	136.00	3.85	32.00	144.00	3.97	33.00	152.00	4.07
8.5	31.75	143.44	3.95	32.75	151.94	4.07	33.75	160.44	4.18	34.75	168.94	4.29
9.0	33.50	159.75	4.16	34.50	168.75	4.29	35.50	177.75	4.40	36.50	186.75	4.52
9.5	35.25	176.94	4.38	36.25	186.44	4.50	37.25	195.94	4.62	38.25	205.44	4.74
10	37.0	195.00	4.60	38.0	205.00	4.72	39.0	215.00	4.84	40.00	225.00	4.96
11	40.5	233.75	5.04	41.5	244.75	5.16	42.5	255.75	5.28	43.50	266.75	5.40

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 2 to 1 and one side slope 1½ to 1**—Con.

Depth	Bottom width 6 feet			Bottom width 7 feet			Bottom width 8 feet			Bottom width 9 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
0.4	7.40	2.68	.35	8.40	3.08	.36	9.40	3.48	.36	10.40	3.88	.37
0.6	8.10	4.28	.50	9.10	4.83	.51	10.10	5.48	.52	11.10	6.08	.53
0.8	8.80	5.92	.64	9.80	6.72	.66	10.80	7.52	.67	11.80	8.32	.68
1.0	9.50	7.75	.77	10.50	8.75	.79	11.50	9.75	.81	12.50	10.75	.82
1.2	10.20	9.72	.90	11.20	10.92	.92	12.20	12.12	.94	13.20	13.32	.96
1.4	10.90	11.83	1.02	11.90	13..3	1.04	12.90	14.63	1.07	13.90	16.03	1.09
1.6	11.60	14.08	1.13	12.60	15.68	1.16	13.60	17.28	1.19	14.60	18.88	1.22
1.8	12.30	16.47	1.24	13.30	18.27	1.28	14.30	20.07	1.31	15.30	21.87	1.34
2.0	13.00	19.00	1.35	14.00	21.00	1.39	15.00	23.00	1.43	16.00	25.00	1.46
2.2	13.70	21.67	1.46	14.70	23.87	1.50	15.70	26.07	1.54	16.70	28.27	1.58
2.4	14.40	24.48	1.56	15.40	26.88	1.61	16.40	29.28	1.65	17.40	31.68	1.69
2.6	15.10	27.43	1.66	16.10	30.03	1.71	17.10	32.63	1.76	18.10	35.23	1.80
2.8	15.80	30.52	1.76	16.80	33.32	1.82	17.80	36.12	1.87	18.80	38.92	1.91
3.0	16.50	33.75	1.86	17.50	36.75	1.92	18.50	39.75	1.98	19.50	42.75	2.02
3.2	17.20	37.12	1.96	18.20	40.32	2.02	19.20	43.52	2.08	20.20	46.72	2.13
3.4	17.90	40.63	2.06	18.90	44.08	2.12	19.90	47.43	2.18	20.90	50.83	2.24
3.6	18.60	44.28	2.15	19.60	47.88	2.22	20.60	51.48	2.28	21.60	55.08	2.34
3.8	19.30	48.07	2.25	20.30	51.87	2.32	21.30	55.67	2.38	22.30	59.47	2.44
4.0	20.00	52.00	2.35	21.00	56.00	2.42	22.00	60.00	2.48	23.00	64.00	2.54
4.2	20.70	56.07	2.45	21.70	60.27	2.51	22.70	64.47	2.58	23.70	68.67	2.64
4.4	21.40	60.28	2.54	22.40	64.68	2.61	23.40	69.08	2.68	24.40	73.48	2.74
4.6	22.10	64.63	2.63	23.10	69.23	2.71	24.10	73.83	2.78	25.10	78.43	2.84
4.8	22.80	69.12	2.72	23.80	73.92	2.80	24.80	78.72	2.87	25.80	83.52	2.94
5.0	23.50	73.75	2.81	24.50	78.75	2.89	25.50	83.75	2.97	26.50	88.75	3.04
5.2	24.20	78.52	2.91	25.20	83.72	2.99	26.20	88.92	3.06	27.20	94.12	3.13
5.4	24.90	83.43	3.00	25.90	88.83	3.08	26.90	94.23	3.16	27.90	99.63	3.23
5.6	25.60	88.48	3.09	26.60	94.08	3.17	27.60	99.68	3.25	28.60	105.28	3.33
5.8	26.30	93.67	3.18	27.30	99.47	3.27	28.30	105.27	3.35	29.30	111.07	3.42
6.0	27.00	99.00	3.27	28.00	105.00	3.36	29.00	111.00	3.44	30.00	117.00	3.52
6.2	27.70	104.27	3.36	28.70	110.47	3.45	29.70	116.67	3.53	30.70	122.87	3.61
6.4	28.40	110.08	3.46	29.40	116.48	3.54	30.40	122.88	3.63	31.40	129.28	3.71
6.6	29.10	115.83	3.55	30.10	122.43	3.64	31.10	129.08	3.72	32.10	135.63	3.80
6.8	29.80	121.72	3.64	30.80	128.52	3.73	31.80	135.32	3.81	32.80	142.12	3.90
7.0	30.50	127.75	3.73	31.50	134.75	3.82	32.50	141.75	3.91	33.50	148.75	3.99
7.5	32.25	143.44	3.95	33.25	150.94	4.05	34.25	158.44	4.14	35.25	165.94	4.22
8.0	34.00	160.00	4.17	35.00	168.00	4.27	36.00	176.00	4.37	37.00	184.00	4.45
8.5	35.75	177.44	4.40	36.75	185.94	4.50	37.75	194.44	4.59	38.75	202.94	4.68
9.0	37.50	195.75	4.62	38.50	204.75	4.72	39.50	213.75	4.82	40.50	222.75	4.91
9.5	39.25	214.94	4.84	40.25	224.44	4.95	41.25	233.94	5.04	42.25	243.44	5.14
10	41.00	235.00	5.06	42.00	245.00	5.17	43.00	255.00	5.27	44.00	265.00	5.36
11	44.50	277.75	5.50	45.50	288.75	5.61	46.50	299.75	5.71	47.50	310.75	5.82

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 2 to 1 and one side slope 1½ to 1**—Con.

Depth	Bottom width 10 feet			Bottom width 12 feet			Bottom width 14 feet			Bottom width 16 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	13.50	11.75	.84	15.50	13.75	.86	17.50	15.75	.87	19.50	17.75	.89
1.2	14.20	14.52	.96	16.20	16.92	1.00	18.20	19.32	1.02	20.20	21.72	1.04
1.4	14.90	17.43	1.11	16.90	20.23	1.15	18.90	23.03	1.17	20.90	25.83	1.19
1.6	15.60	20.48	1.24	17.60	23.68	1.28	19 60	26.88	1.31	21.60	30.08	1.34
1.8	16.30	23.67	1.37	18.30	27.27	1.41	20.30	30.87	1.45	22.30	34.47	1.48
2.0	17.00	27.00	1.49	19.00	31.00	1.54	21.00	35.00	1.58	23.00	39.00	1.62
2.2	17.70	30.47	1.61	19.70	34.87	1.67	21.70	39.27	1.72	23.70	43.67	1.75
2.4	18.40	34.08	1.73	20.40	38.88	1.79	22.40	43.68	1.84	24.40	48.48	1.89
2.6	19.10	37.83	1.84	21.10	43.03	1.91	23.10	48.23	1.97	25.10	53.43	2.02
2.8	19.80	41.72	1.96	21.80	47.32	2.03	23.80	52.92	2.09	25.80	58.52	2.14
3.0	20.50	45.75	2.07	22.50	51.75	2.15	24.50	57.75	2.21	26.50	63.75	2 27
3.2	21.20	49.92	2.18	23.20	56.32	2.28	25.20	62.72	2.33	27.20	69.12	2.39
3.4	21.90	54.23	2.28	23.90	61.03	2.37	25.90	67.83	2.44	27.90	74.63	2.51
3.6	22.60	58.68	2.39	24.60	65 88	2.48	26.60	73.08	2.56	28.60	80.28	2.63
3.8	23.30	63.27	2.50	25.30	70.67	2.59	27.30	78.47	2.67	29.30	86.07	2.74
4.0	24.00	68.00	2.60	26.00	76.00	2.70	28.00	84.00	2.78	30.00	92.00	2 86
4.2	24.70	72.87	2.70	26.70	81.27	2.80	28.70	89.67	2.89	30.70	98.07	2 97
4.4	25.40	77.88	2.80	27.40	86.68	2.91	29.40	95.48	3.00	31.40	104.28	3.09
4.6	26.10	83.03	2.90	28.10	92.23	3.01	30.10	101.43	3.11	32.10	110.63	3.20
4.8	26.80	88.32	3.00	28.80	97.92	3.12	30.80	107.52	3.22	32.80	117.12	3.31
5.0	27.50	93.75	3.10	29.50	103.75	3.22	31.50	113.75	3.33	33.50	123.75	3.42
5.2	28.20	99.32	3.20	30.20	109.72	3.33	32.20	120.12	3.43	34.20	130.52	3.53
5.4	28.90	105.03	3.30	30.90	115.83	3.43	32.90	126.63	3.54	34.90	137.43	3.63
5.6	29.60	110.88	3.40	31.60	122.08	3.53	33.60	133.28	3.64	35.60	144.48	3.74
5.8	30.30	116.87	3.50	32.30	128.47	3.63	34.30	140.07	3.74	36.30	151.67	3.85
6.0	31.00	123.00	3.59	33.00	135.00	3.73	35.00	147.00	3.84	37.00	159.00	3.95
6.2	31.70	129.27	3.69	33.70	141.67	3.83	35.70	154.07	3.95	37.70	166.47	4.05
6.4	32.40	135.68	3.78	34.40	148.48	3.92	36.40	161.28	4.05	38.40	174.08	4.16
6.6	33.10	142.23	3.88	35.10	155.43	4.02	37.10	168.63	4.15	39.10	181.83	4.26
6.8	33.80	148.92	3.97	35.80	162.52	4.12	37.80	176.12	4.25	39.80	189.72	4.36
7.0	34.50	155.75	4.07	36.50	169.75	4.22	38.50	183.75	4.35	40.50	197.75	4.47
7.5	36.25	173.44	4.30	38.25	188.44	4.46	40.25	203.44	4.59	42.25	218.44	4.72
8.0	38.00	192.00	4.54	40.00	208.00	4.69	42.00	224.00	4.84	44.00	240.00	4.97
8.5	39.75	211.44	4.77	41.75	228.44	4.93	43.75	245.44	5.08	45.75	262.44	5.22
9.0	41.50	231.75	5.00	43.50	249.75	5.17	45.50	267.75	5.32	47.50	285.75	5.46
9.5	43.25	252.94	5.23	45.25	271.94	5.40	47.25	290.94	5.56	49.25	309.94	5.70
10.0	45.00	275.00	5.46	47.00	295.00	5.63	49.00	315.00	5.79	51.00	335.00	5.94
10.5	46.75	297.94	5.68	48.75	318.94	5.86	50 75	339.94	6.03	52.75	360.94	6.18
11	48.50	321.75	5.91	50.50	343.75	6.09	52.50	365.75	6.26	54.50	387.75	6.42
12	52.00	372.00	6.36	54.00	396.00	6.55	56.00	420.00	6.72	58.00	444.00	6.89
13	55.50	425.75	6.81	57.50	451.75	7.09	59.50	477.75	7.19	61.50	503.75	7.35

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

one side slope 2 to 1 and one side slope 1½ to 1—Con.

Depth	Bottom width 18 feet			Bottom width 20 feet			Bottom width 22 feet			Bottom width 24 feet		
	T	A	$r=\frac{\text{area}}{\text{wet per.}}$	T	A	$r=\frac{\text{area}}{\text{wet per.}}$	T	A	$r=\frac{\text{area}}{\text{wet per.}}$	T	A	$r=\frac{\text{area}}{\text{wet per.}}$
1.0	21.80	19.75	.90	23.80	21.75	.90	25.80	23.75	.91	27.80	25.75	.92
1.2	22.20	24.12	1.08	24.20	26.52	1.07	26.20	28.92	1.08	28.20	31.32	1.09
1.4	22.60	28.63	1.21	24.60	31.43	1.22	26.60	34.23	1.24	28.60	37.03	1.25
1.6	23.00	33.28	1.36	25.00	36.48	1.38	27.00	39.68	1.39	29.00	42.88	1.41
1.8	24.20	38.07	1.51	26.20	41.67	1.53	28.20	45.27	1.55	30.20	48.87	1.56
2.0	25.60	43.00	1.65	27.60	47.00	1.67	29.60	51.00	1.70	31.60	55.00	1.71
2.2	25.70	48.07	1.79	27.70	52.47	1.82	29.70	56.87	1.84	31.70	61.27	1.86
2.4	26.40	53.28	1.92	28.40	58.08	1.96	30.40	62.88	1.98	32.40	67.68	2.01
2.6	27.10	58.63	2.06	29.10	63.83	2.09	31.10	69.03	2.12	33.10	74.23	2.15
2.8	27.80	64.12	2.19	29.80	69.72	2.23	31.80	75.32	2.26	33.80	80.92	2.29
3.0	28.50	69.75	2.31	30.50	75.75	2.36	32.50	81.75	2.40	34.50	87.75	2.43
3.2	29.20	75.52	2.44	31.20	81.92	2.49	33.20	88.32	2.53	35.20	94.72	2.57
3.4	29.90	81.43	2.57	31.90	88.23	2.61	33.90	95.03	2.66	35.90	101.83	2.70
3.6	30.60	87.48	2.69	32.60	94.68	2.74	34.60	101.88	2.79	36.60	109.08	2.83
3.8	31.30	93.67	2.81	33.30	101.27	2.86	35.30	108.87	2.91	37.30	116.47	2.96
4.0	32.00	100.00	2.93	34.00	108.00	2.99	36.00	116.00	3.04	38.00	124.00	3.09
4.2	32.70	106.47	3.04	34.70	114.67	3.11	36.70	123.27	3.16	38.70	131.67	3.21
4.4	33.40	113.08	3.16	35.40	121.48	3.23	37.40	130.68	3.29	39.40	139.48	3.34
4.6	34.10	119.83	3.28	36.10	128.43	3.34	38.10	138.23	3.41	40.10	147.43	3.46
4.8	34.80	126.72	3.39	36.80	135.32	3.46	38.80	145.92	3.53	40.80	155.52	3.58
5.0	35.50	133.75	3.50	37.50	142.75	3.58	39.50	153.75	3.64	41.50	163.75	3.70
5.2	36.20	140.92	3.61	38.20	151.32	3.69	40.20	161.72	3.76	42.20	172.12	3.82
5.4	36.90	148.23	3.72	38.90	159.63	3.80	40.90	169.83	3.88	42.90	180.03	3.94
5.6	37.60	155.68	3.83	39.60	168.08	3.92	41.60	178.08	3.99	43.60	189.28	4.06
5.8	38.30	163.27	3.94	40.30	174.67	4.03	42.30	186.47	4.11	44.30	198.67	4.18
6.0	39.00	171.00	4.05	41.00	183.00	4.14	43.00	195.00	4.22	45.00	207.00	4.29
6.2	39.70	178.87	4.15	41.70	191.27	4.25	43.70	203.67	4.33	45.70	216.07	4.41
6.4	40.40	186.88	4.26	42.40	199.68	4.35	44.40	212.48	4.44	46.40	225.28	4.52
6.6	41.10	195.03	4.37	43.10	208.23	4.46	45.10	221.43	4.55	47.10	234.63	4.63
6.8	41.80	203.32	4.47	43.80	216.92	4.57	45.80	230.52	4.66	47.80	244.12	4.74
7.0	42.50	211.75	4.58	44.50	225.75	4.68	46.50	239.75	4.77	48.50	253.75	4.85
7.5	44.25	233.44	4.83	46.25	248.44	4.94	48.25	265.44	5.04	50.25	278.44	5.13
8.0	46.00	255.00	5.09	48.00	272.00	5.20	50.00	289.00	5.30	52.00	304.00	5.40
8.5	47.75	279.44	5.34	49.75	296.44	5.46	51.75	313.44	5.56	53.75	330.44	5.67
9.0	49.50	303.75	5.59	51.50	321.75	5.71	53.50	339.75	5.82	55.50	357.75	5.93
9.5	51.25	328.94	5.84	53.25	347.94	5.96	55.25	366.94	6.08	57.25	385.94	6.19
10.0	53.00	355.00	6.08	55.00	375.00	6.21	57.00	395.00	6.33	59.00	415.00	6.44
10.5	54.75	381.94	6.32	56.75	402.94	6.45	58.75	423.94	6.58	60.75	444.94	6.70
11	56.50	409.75	6.56	58.50	431.75	6.70	60.50	453.75	6.83	62.50	475.75	6.95
12	60.00	468.00	7.04	62.00	492.00	7.18	64.00	516.00	7.32	66.00	540.00	7.43
13	63.50	529.75	7.51	65.50	555.75	7.66	67.50	581.75	7.81	69.50	607.75	7.94

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,*

one side slope 2 to 1 and one side slope 1½ to 1—Con.

Depth	Bottom width 26 feet			Bottom width 28 feet			Bottom width 30 feet			Bottom width 32 feet		
	T	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$	*T*	*A*	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	29.50	27.75	.92	31.50	29.75	.93	33.50	31.75	.93	35.50	33.75	.94
1.2	30.20	33.72	1.09	32.20	36.12	1.10	34.20	38.52	1.10	36.20	40.92	1.11
1.4	30.90	39.83	1.26	32.90	42.63	1.27	34.90	45.43	1.27	36.90	48.23	1.28
1.6	31.60	46.06	1.42	33.60	49.28	1.43	35.60	52.48	1.44	37.60	55.68	1.45
1.8	32.30	52.47	1.58	34.30	56.07	1.59	36.30	59.67	1.60	38.30	63.27	1.61
2.0	33.00	59.00	1.73	35.00	63.00	1.75	37.00	67.00	1.76	39.00	71.00	1.77
2.2	33.70	65.67	1.88	35.70	70.07	1.90	37.70	74.47	1.92	39.70	78.87	1.93
2.4	34.40	72.48	2.03	36.40	77.28	2.05	38.40	82.08	2.07	40.40	86.88	2.08
2.6	35.10	79.43	2.18	37.10	84.63	2.20	39.10	89.83	2.22	41.10	95.03	2.24
2.8	35.80	86.52	2.32	37.80	92.12	2.34	39.80	97.72	2.36	41.80	103.32	2.39
3.0	36.50	93.75	2.46	38.50	99.75	2.49	40.50	105.75	2.51	42.50	111.75	2.53
3.2	37.20	101.12	2.60	39.20	107.52	2.63	41.20	113.92	2.65	43.20	120.32	2.68
3.4	37.90	108.63	2.73	39.90	115.43	2.77	41.90	122.23	2.79	43.90	129.03	2.82
3.6	38.60	116.28	2.87	40.60	123.48	2.90	42.60	130.68	2.93	44.60	137.88	2.96
3.8	39.30	124.07	3.00	41.30	131.67	3.04	43.30	139.27	3.07	45.30	146.87	3.10
4.0	40.00	132.00	3.13	42.00	140.00	3.17	44.00	148.00	3.21	46.00	156.00	3.24
4.2	40.70	140.07	3.26	42.70	148.47	3.30	44.70	156.87	3.34	46.70	165.27	3.38
4.4	41.40	148.28	3.39	43.40	157.08	3.43	45.40	165.88	3.47	47.40	174.68	3.51
4.6	42.10	156.63	3.51	44.10	165.83	3.56	46.10	175.03	3.60	48.10	184.23	3.64
4.8	42.80	165.12	3.64	44.80	174.72	3.69	46.80	184.32	3.73	48.80	193.92	3.77
5.0	43.50	173.75	3.76	45.50	183.75	3.81	47.50	193.75	3.86	49.50	203.75	3.90
5.2	44.20	182.52	3.88	46.20	192.92	3.94	48.20	203.32	3.98	50.20	213.72	4.03
5.4	44.90	191.43	4.00	46.90	202.23	4.06	48.90	213.03	4.11	50.90	223.83	4.16
5.6	45.60	200.48	4.12	47.60	211.68	4.18	49.60	222.88	4.23	51.60	234.08	4.29
5.8	46.30	209.67	4.24	48.30	221.27	4.30	50.30	232.87	4.36	52.30	244.47	4.41
6.0	47.00	219.00	4.36	49.00	231.00	4.42	51.00	243.00	4.48	53.00	255.00	4.54
6.2	47.70	228.47	4.48	49.70	240.87	4.54	51.70	253.27	4.60	53.70	265.67	4.66
6.4	48.40	238.08	4.59	50.40	250.88	4.66	52.40	263.68	4.72	54.40	276.48	4.78
6.6	49.10	247.83	4.71	51.10	261.03	4.78	53.10	274.23	4.84	55.10	287.43	4.90
6.8	49.80	257.72	4.82	51.80	271.32	4.89	53.80	284.92	4.96	55.80	298.52	5.02
7.0	50.50	267.75	4.93	52.50	281.75	5.01	54.50	295.75	5.07	56.50	309.75	5.14
7.5	52.25	293.44	5.21	54.25	308.44	5.29	56.25	323.44	5.36	58.25	338.44	5.43
8.0	54.00	320.00	5.49	56.00	336.00	5.57	58.00	352.00	5.65	60.00	368.00	5.72
8.5	55.75	347.44	5.76	57.75	364.44	5.85	59.75	381.44	5.93	61.75	398.44	6.01
9.0	57.50	375.75	6.03	59.50	393.75	6.12	61.50	411.75	6.21	63.50	429.75	6.29
9.5	59.25	404.94	6.29	61.25	423.94	6.39	63.25	442.94	6.48	65.25	461.94	6.56
10.0	61.00	435.00	6.55	63.00	455.00	6.65	65.00	475.00	6.75	67.00	495.00	6.84
10.5	62.75	465.94	6.81	64.75	486.94	6.92	66.75	507.94	7.01	68.75	528.94	7.11
11	64.50	497.75	7.07	66.50	519.75	7.18	68.50	541.75	7.28	70.50	563.75	7.38
12	68.00	564.00	7.57	70.00	588.00	7.69	72.00	612.00	7.80	74.00	636.00	7.90
13	71.50	633.75	8.07	73.50	659.75	8.20	75.50	685.75	8.31	77.50	711.75	8.42

Table 20.—*Area in square feet, A, top width in feet, T, and hydraulic radius in feet, r, of trapezoidal channels,* **one side slope 2 to 1 and one side slope 1½ to 1**—Con.

Depth	Bottom width 35 feet			Bottom width 40 feet			Bottom width 45 feet			Bottom width 50 feet		
	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$	T	A	$r = \frac{\text{area}}{\text{wet per.}}$
1.0	38.50	36.75	.94	43.50	41.75	.95	48.50	46.75	.95	53.50	51.75	.96
1.2	39.20	44.52	1.12	44.20	50.52	1.13	49.20	56.52	1.13	54.20	62.52	1.14
1.4	39.90	52.43	1.29	44.90	59.43	1.30	49.90	66.43	1.31	54.90	73.43	1.32
1.6	40.60	60.48	1.46	45.60	68.48	1.47	50.60	76.48	1.49	55.60	84.48	1.50
1.8	41.30	68.67	1.62	46.30	77.67	1.64	51.30	86.67	1.66	56.30	95.67	1.67
2.0	42.00	77.00	1.79	47.00	87.00	1.81	52.00	97.00	1.83	57.00	107.00	1.84
2.2	42.70	85.47	1.95	47.70	96.47	1.97	52.70	107.47	1.99	57.70	118.47	2.01
2.4	43.40	94.08	2.10	48.40	106.08	2.13	53.40	118.08	2.16	58.40	130.08	2.18
2.6	44.10	102.83	2.26	49.10	115.83	2.29	54.10	128.83	2.32	59.10	141.83	2.34
2.8	44.80	111.72	2.41	49.80	125.72	2.45	54.80	139.72	2.48	59.80	153.72	2.51
3.0	45.50	120.75	2.56	50.50	135.75	2.60	55.50	150.75	2.64	60.50	165.75	2.67
3.2	46.20	129.92	2.71	51.20	145.92	2.76	56.20	161.92	2.80	61.20	177.92	2.83
3.4	46.90	139.23	2.86	51.90	156.23	2.91	56.90	173.23	2.95	61.90	190.23	2.99
3.6	47.60	148.68	3.00	52.60	166.68	3.06	57.60	184.68	3.10	62.60	202.68	3.14
3.8	48.30	158.27	3.14	53.30	177.27	3.20	58.30	196.27	3.25	63.30	215.27	3.29
4.0	49.00	168.00	3.28	54.00	188.00	3.35	59.00	208.00	3.40	64.00	228.00	3.45
4.2	49.70	177.87	3.42	54.70	198.87	3.49	59.70	219.87	3.55	64.70	240.87	3.60
4.4	50.40	187.88	3.56	55.40	209.88	3.63	60.40	231.88	3.70	65.40	253.88	3.75
4.6	51.10	198.03	3.70	56.10	221.03	3.77	61.10	244.03	3.84	66.10	267.03	3.90
4.8	51.80	208.32	3.83	56.80	232.32	3.91	61.80	256.32	3.98	66.80	280.32	4.04
5.0	52.50	218.75	3.96	57.50	243.75	4.05	62.50	268.75	4.12	67.50	293.75	4.18
5.2	53.20	229.32	4.09	58.20	255.32	4.18	63.20	281.32	4.26	68.20	307.32	4.32
5.4	53.90	240.03	4.22	58.90	267.03	4.32	63.90	294.03	4.40	68.90	321.03	4.47
5.6	54.60	250.88	4.35	59.60	278.88	4.45	64.60	306.88	4.49	69.60	334.88	4.61
5.8	55.30	261.87	4.48	60.30	290.87	4.58	65.30	319.87	4.67	70.30	348.87	4.75
6.0	56.00	273.00	4.61	61.00	303.00	4.72	66.00	333.00	4.81	71.00	363.00	4.89
6.2	56.70	284.27	4.74	61.70	315.27	4.85	66.70	346.27	4.94	71.70	377.27	5.02
6.4	57.40	295.68	4.86	62.40	327.68	4.98	67.40	359.68	5.08	72.40	391.68	5.16
6.6	58.10	307.23	4.98	63.10	340.23	5.10	68.10	373.23	5.21	73.10	406.23	5.30
6.8	58.80	318.92	5.10	63.80	352.92	5.23	68.80	386.92	5.34	73.80	420.92	5.43
7.0	59.50	330.75	5.23	64.50	365.75	5.36	69.50	400.75	5.47	74.50	435.75	5.57
7.5	61.25	360.94	5.58	66.25	398.44	5.67	71.25	435.94	5.79	76.25	473.44	5.90
8.0	63.00	392.00	5.82	68.00	432.00	5.97	73.00	472.00	6.10	78.00	512.00	6.22
8.5	64.75	423.94	6.11	69.75	466.44	6.28	74.75	508.94	6.41	79.75	551.44	6.54
9.0	66.50	456.75	6.40	71.50	501.75	6.57	76.50	546.75	6.72	81.50	591.75	6.85
9.5	68.25	490.44	6.68	73.25	537.94	6.86	78.25	585.44	7.02	83.25	632.94	7.16
10.0	70.00	525.00	6.96	75.00	575.00	7.15	80.00	625.00	7.32	85.00	675.00	7.47
10.5	71.75	560.44	7.24	76.75	612.94	7.32	81.75	665.44	7.62	86.75	717.94	7.76
11	73.50	596.75	7.51	78.50	651.75	7.72	83.50	706.75	7.90	88.50	761.75	8.06
12	77.00	672.00	8.05	82.00	732.00	8.27	87.00	792.00	8.47	92.00	852.00	8.65
13	80.50	750.75	8.58	85.50	815.75	8.82	90.50	880.75	9.03	95.50	945.75	9.2[illegible]

Table 21.—*Discharge in cu.-ft. of Cipolletti and suppressed, thin-edged rectangular weirs, computed from* $Q = 3.367\ LH^{\frac{3}{2}}$.

Depth on crest (feet)	Length of weir in feet									
	100	150	200	300	400	500	600	700	800	900
0.01	0.3	1	1	1	1	2	2	2	3	3
.02	1.0	1	2	3	4	5	6	7	8	9
.03	1.8	3	4	5	7	9	11	12	14	16
.04	2.7	4	5	8	11	13	16	19	22	24
.05	3.8	6	8	11	15	19	23	26	30	34
.06	5.0	7	10	15	20	25	30	35	40	45
.07	6.2	9	12	19	25	31	37	44	50	56
.08	7.6	11	15	23	30	38	46	53	61	69
.09	9.1	14	18	27	36	45	55	64	73	82
.10	10.7	16	21	32	43	53	64	75	85	96
.11	12.3	18	25	37	49	61	74	86	98	111
.12	14.0	21	28	42	56	70	84	98	112	126
.13	15.8	24	32	47	63	79	95	110	126	142
.14	17.6	26	35	53	71	88	106	123	141	159
.15	19.6	29	39	59	78	98	117	137	156	176
.16	21.6	32	43	65	86	108	129	151	172	194
.17	23.6	35	47	71	94	118	142	165	189	212
.18	25.7	39	51	77	103	129	154	180	206	231
.19	27.9	42	56	84	112	139	167	195	223	251
.20	30.1	45	60	90	120	151	181	211	241	271
.21	32.4	49	65	97	130	162	194	227	259	292
.22	34.7	52	69	104	139	174	208	243	278	313
.23	37.1	56	74	111	149	186	223	260	297	334
.24	39.6	59	79	119	158	198	238	277	317	356
.25	42.1	63	84	126	168	210	253	295	337	379
.26	44.6	67	89	134	179	223	268	312	357	402
.27	47.2	71	94	142	189	236	283	331	378	425
.28	49.9	75	100	150	200	249	299	349	399	449
.29	52.6	79	105	158	210	263	315	368	421	473
.30	55.3	83	111	166	221	277	332	387	443	498
.31	58.1	87	116	174	232	291	349	407	465	523
.32	60.9	91	122	183	244	305	366	427	488	548
.33	63.8	96	128	191	255	319	383	447	511	574
.34	66.7	100	133	200	267	334	400	467	534	601
.35	69.7	105	139	209	279	349	418	488	558	627
.36	72.7	109	145	218	291	364	436	509	582	654
.37	75.8	114	152	227	303	379	455	530	606	682
.38	78.9	118	158	237	315	394	473	552	631	710
.39	82.0	123	164	246	328	410	492	574	656	738
.40	85.2	128	170	256	341	426	511	596	681	767
.41	88.4	133	177	265	354	442	530	619	707	795
.42	91.8	137	183	275	367	458	550	641	733	825
.43	94.2	142	190	285	380	475	570	665	759	854
.44	98.3	147	197	295	393	491	590	688	786	884
.45	101.8	153	203	306	407	509	610	712	813	915
.46	105.0	158	210	315	420	525	630	735	840	945
.47	108.5	163	217	325	434	542	651	759	868	976
.48	112.2	168	224	336	448	560	672	784	896	1,008
.49	115.5	173	231	346	462	577	693	808	924	1,039
.50	119.0	179	238	357	476	595	714	833	952	1,071

Table 21.—*Discharge in sec.-ft. of Cipolletti and suppressed, thin-edged rect. weirs, computed from* $Q = 3.367\ LH^{\frac{3}{2}}$—Continued.

Depth on crest (feet)	Length of weir in feet									
	100	150	200	300	400	500	600	700	800	900
0.51	122.8	184	245	368	490	613	736	858	981	1,104
.52	126.2	189	252	379	505	631	757	884	1,010	1,136
.53	129.9	195	260	390	520	650	779	909	1,039	1,169
.54	133.6	200	267	401	534	668	802	935	1,069	1,202
.55	137.3	206	275	412	549	687	824	961	1,099	1,236
.56	141.1	212	282	423	564	705	847	988	1,129	1,270
.57	144.9	217	290	435	580	724	869	1,014	1,159	1,304
.58	148.7	223	297	446	595	744	892	1,041	1,190	1,338
.59	152.5	229	305	458	610	763	915	1,068	1,221	1,373
.60	156.5	235	313	469	626	782	939	1,095	1,252	1,408
.61	160.4	241	321	481	642	802	962	1,123	1,283	1,444
.62	164.4	247	329	493	657	822	986	1,151	1,315	1,479
.63	168.3	253	337	505	673	842	1,010	1,178	1,347	1,515
.64	172.4	259	345	517	689	862	1,034	1,207	1,379	1,551
.65	176.4	265	353	529	706	882	1,059	1,235	1,411	1,588
.66	180.5	271	361	542	722	903	1,083	1,264	1,444	1,625
.67	184.6	277	369	554	739	923	1,108	1,292	1,477	1,662
.68	188.8	283	378	566	755	944	1,133	1,321	1,510	1,699
.69	193.0	289	386	579	772	965	1,158	1,351	1,544	1,737
.70	197.2	296	394	592	789	986	1,183	1,380	1,577	1,775
.71	201.4	302	403	604	806	1,007	1,208	1,410	1,611	1,813
.72	205.7	309	411	617	823	1,028	1,234	1,440	1,645	1,851
.73	210.0	315	420	630	840	1,050	1,260	1,470	1,680	1,890
.74	214.3	321	429	643	857	1,072	1,286	1,500	1,715	1,929
.75	218.7	328	437	656	875	1,093	1,312	1,531	1,749	1,968
.76	223.1	334	446	669	892	1,115	1,338	1,561	1,784	2,008
.77	227.5	341	455	682	910	1,137	1,365	1,592	1,820	2,047
.78	231.9	348	464	696	928	1,160	1,392	1,623	1,855	2,087
.79	236.4	354	473	709	946	1,182	1,418	1,655	1,891	2,128
.80	240.9	361	482	723	964	1,205	1,445	1,686	1,927	2,168
.81	245.4	368	491	736	982	1,227	1,473	1,718	1,963	2,209
.82	250.0	375	500	750	1,000	1,250	1,500	1,750	2,000	2,250
.83	254.6	382	509	764	1,018	1,273	1,527	1,782	2,037	2,291
.84	259.2	389	518	778	1,037	1,296	1,555	1,814	2,074	2,333
.85	263.8	396	528	792	1,055	1,319	1,583	1,847	2,111	2,374
.86	268.5	403	537	806	1,074	1,343	1,611	1,880	2,148	2,417
.87	273.2	410	546	820	1,093	1,366	1,639	1,912	2,186	2,459
.88	277.9	417	556	834	1,112	1,390	1,668	1,945	2,223	2,501
.89	282.7	424	565	848	1,131	1,413	1,696	1,979	2,261	2,544
.90	287.5	431	575	862	1,150	1,437	1,725	2,012	2,300	2,587
.91	292.3	438	585	877	1,169	1,461	1,754	2,046	2,338	2,630
.92	297.1	446	594	891	1,188	1,485	1,783	2,080	2,377	2,674
.93	301.9	453	604	906	1,208	1,510	1,812	2,114	2,416	2,717
.94	306.8	460	614	920	1,227	1,534	1,841	2,148	2,455	2,761
.95	311.7	468	623	935	1,247	1,559	1,870	2,182	2,494	2,806
.96	316.7	475	633	950	1,267	1,583	1,900	2,217	2,533	2,850
.97	321.6	482	643	965	1,287	1,608	1,930	2,251	2,573	2,895
.98	326.6	490	653	980	1,306	1,633	1,960	2,286	2,613	2,940
.99	331.6	497	663	995	1,327	1,658	1,990	2,321	2,653	2,985
1.00	336.7	505	673	1,010	1,347	1,683	2,020	2,357	2,693	3,030

Table 21.—*Discharge in sec.-ft. of Cipolletti and suppressed, thin-edged rect. weirs, computed from* $Q=3.367\ LH^{\frac{3}{2}}$—Continued.

Depth on crest (feet)	Length of weir in feet								
	100	200	300	400	500	600	700	800	900
1.01	341.7	683	1,025	1,367	1,709	2,050	2,392	2,734	3,076
1.02	346.8	694	1,040	1,387	1,734	2,081	2,428	2,775	3,121
1.03	351.9	704	1,056	1,408	1,760	2,112	2,464	2,815	3,167
1.04	357.1	714	1,071	1,428	1,785	2,142	2,499	2,857	3,214
1.05	362.2	724	1,087	1,449	1,811	2,173	2,536	2,898	3,260
1.06	367.4	735	1,102	1,470	1,837	2,205	2,572	2,939	3,307
1.07	372.6	745	1,118	1,491	1,863	2,236	2,608	2,981	3,354
1.08	377.9	756	1,134	1,511	1,889	2,267	2,645	3,023	3,401
1.09	383.1	766	1,149	1,532	1,916	2,299	2,682	3,065	3,448
1.10	388.4	777	1,165	1,554	1,942	2,330	2,719	3,107	3,496
1.11	393.7	787	1,181	1,575	1,969	2,362	2,756	3,150	3,543
1.12	399.0	798	1,197	1,596	1,995	2,394	2,793	3,192	3,591
1.13	404.4	809	1,213	1,618	2,022	2,426	2,831	3,235	3,640
1.14	409.8	820	1,229	1,639	2,049	2,459	2,869	3,278	3,688
1.15	415.2	830	1,246	1,661	2,076	2,491	2,906	3,322	3,737
1.16	420.6	841	1,262	1,682	2,103	2,524	2,944	3,365	3,786
1.17	426.1	852	1,278	1,704	2,130	2,556	2,982	3,409	3,835
1.18	431.5	863	1,295	1,726	2,158	2,589	3,021	3,452	3,884
1.19	437.0	874	1,311	1,748	2,185	2,622	3,059	3,496	3,933
1.20	442.6	885	1,328	1,770	2,213	2,655	3,098	3,540	3,983
1.21	448.1	896	1,344	1,792	2,240	2,689	3,137	3,585	4,033
1.22	453.7	907	1,361	1,815	2,268	2,722	3,176	3,629	4,083
1.23	459.3	919	1,378	1,837	2,296	2,756	3,215	3,674	4,133
1.24	464.9	930	1,395	1,859	2,324	2,789	3,254	3,719	4,184
1.25	470.5	941	1,412	1,882	2,353	2,823	3,294	3,764	4,235
1.26	476.2	952	1,428	1,905	2,381	2,857	3,333	3,809	4,285
1.27	481.8	964	1,446	1,927	2,409	2,891	3,373	3,855	4,337
1.28	487.5	975	1,463	1,950	2,438	2,925	3,413	3,900	4,388
1.29	493.3	987	1,480	1,973	2,466	2,960	3,453	3,946	4,439
1.30	499.0	998	1,497	1,996	2,495	2,994	3,493	3,992	4,491
1.31	504.8	1,010	1,514	2,019	2,524	3,029	3,534	4,038	4,543
1.32	510.6	1,021	1,532	2,042	2,553	3,063	3,574	4,085	4,595
1.33	516.4	1,033	1,549	2,066	2,582	3,098	3,615	4,131	4,648
1.34	522.2	1,044	1,567	2,089	2,611	3,133	3,656	4,178	4,700
1.35	528.1	1,056	1,584	2,112	2,640	3,168	3,697	4,225	4,753
1.36	534.0	1,068	1,602	2,136	2,670	3,204	3,738	4,272	4,806
1.37	539.9	1,080	1,620	2,159	2,699	3,239	3,779	4,319	4,859
1.38	545.8	1,092	1,637	2,183	2,729	3,275	3,820	4,366	4,912
1.39	551.7	1,103	1,655	2,207	2,759	3,310	3,862	4,414	4,965
1.40	557.7	1,115	1,673	2,231	2,788	3,346	3,904	4,462	5,019
1.41	563.7	1,127	1,691	2,255	2,818	3,382	3,946	4,509	5,073
1.42	569.7	1,139	1,709	2,279	2,848	3,418	3,988	4,557	5,127
1.43	575.7	1,151	1,727	2,303	2,879	3,454	4,030	4,606	5,181
1.44	581.8	1,164	1,745	2,327	2,909	3,491	4,072	4,654	5,236
1.45	587.8	1,176	1,763	2,351	2,939	3,527	4,115	4,703	5,290
1.46	593.9	1,188	1,782	2,376	2,970	3,564	4,157	4,751	5,345
1.47	600.0	1,200	1,800	2,400	3,000	3,600	4,200	4,800	5,400
1.48	606.2	1,212	1,819	2,425	3,031	3,637	4,243	4,849	5,456
1.49	612.3	1,225	1,837	2,449	3,062	3,674	4,286	4,899	5,511
1.50	618.5	1,237	1,856	2,474	3,092	3,711	4,330	4,948	5,566

Table 21.—*Discharge in sec.-ft. of Cipolletti and suppressed, thin-edged rect. weirs, computed from* $Q=3.367\ LH^{\frac{3}{2}}$—Continued.

Depth on crest (feet)	Length of weir in feet								
	100	200	300	400	500	600	700	800	900
1.51	624.7	1,249	1,874	2,499	3,123	3,748	4,373	4,998	5,622
1.52	630.9	1,262	1,893	2,524	3,155	3,785	4,416	5,047	5,678
1.53	637.1	1,274	1,911	2,549	3,186	3,823	4,460	5,097	5,734
1.54	643.4	1,287	1,930	2,574	3,217	3,860	4,504	5,147	5,791
1.55	649.7	1,299	1,949	2,599	3,248	3,898	4,548	5,197	5,847
1.56	656.0	1,312	1,968	2,624	3,280	3,936	4,592	5,248	5,904
1.57	662.3	1,325	1,987	2,649	3,311	3,974	4,636	5,298	5,961
1.58	668.6	1,337	2,006	2,675	3,343	4,012	4,680	5,349	6,018
1.59	675.0	1,350	2,025	2,700	3,375	4,050	4,725	5,400	6,075
1.60	681.4	1,363	2,044	2,725	3,407	4,088	4,770	5,451	6,132
1.61	687.8	1,376	2,063	2,751	3,439	4,127	4,814	5,502	6,190
1.62	694.2	1,388	2,083	2,777	3,471	4,165	4,859	5,553	6,248
1.63	700.6	1,401	2,102	2,802	3,503	4,204	4,904	5,605	6,306
1.64	707.1	1,414	2,121	2,828	3,535	4,242	4,950	5,657	6,364
1.65	713.6	1,427	2,141	2,854	3,568	4,281	4,995	5,708	6,422
1.66	720.0	1,440	2,160	2,880	3,600	4,320	5,040	5,760	6,480
1.67	726.6	1,453	2,180	2,906	3,633	4,359	5,086	5,813	6,539
1.68	733.1	1,466	2,199	2,932	3,666	4,399	5,132	5,865	6,598
1.69	739.7	1,479	2,219	2,959	3,698	4,438	5,178	5,917	6,657
1.70	746.2	1,492	2,239	2,985	3,731	4,477	5,224	5,970	6,716
1.71	752.8	1,506	2,258	3,011	3,764	4,517	5,270	6,023	6,775
1.72	759.4	1,519	2,278	3,038	3,797	4,557	5,316	6,076	6,835
1.73	766.1	1,532	2,298	3,064	3,830	4,596	5,362	6,129	6,895
1.74	772.7	1,545	2,318	3,091	3,864	4,636	5,409	6,182	6,954
1.75	779.4	1,559	2,338	3,118	3,897	4,676	5,456	6,235	7,015
1.76	786.1	1,572	2,358	3,144	3,930	4,716	5,503	6,289	7,075
1.77	792.8	1,586	2,378	3,171	3,964	4,757	5,550	6,342	7,135
1.78	799.5	1,599	2,399	3,198	3,998	4,797	5,597	6,396	7,196
1.79	806.3	1,613	2,419	3,225	4,031	4,838	5,644	6,450	7,256
1.80	813.0	1,626	2,439	3,252	4,065	4,878	5,691	6,504	7,317
1.81	819.8	1,640	2,459	3,279	4,099	4,919	5,739	6,559	7,378
1.82	826.6	1,653	2,480	3,306	4,133	4,960	5,786	6,613	7,440
1.83	833.4	1,667	2,500	3,334	4,167	5,001	5,834	6,668	7,501
1.84	840.3	1,681	2,521	3,361	4,201	5,042	5,882	6,722	7,563
1.85	847.1	1,694	2,541	3,389	4,236	5,083	5,930	6,777	7,624
1.86	854.0	1,708	2,562	3,416	4,270	5,124	5,978	6,832	7,686
1.87	860.9	1,722	2,583	3,444	4,305	5,166	6,026	6,887	7,748
1.88	867.8	1,736	2,603	3,471	4,339	5,207	6,075	6,943	7,810
1.89	874.8	1,750	2,624	3,499	4,374	5,249	6,123	6,998	7,873
1.90	881.7	1,763	2,645	3,527	4,409	5,290	6,172	7,054	7,935
1.91	888.7	1,777	2,666	3,555	4,443	5,332	6,221	7,110	7,998
1.92	895.7	1,791	2,687	3,583	4,478	5,374	6,270	7,165	8,061
1.93	902.7	1,805	2,708	3,611	4,513	5,416	6,319	7,221	8,124
1.94	909.7	1,819	2,729	3,639	4,549	5,458	6,368	7,278	8,187
1.95	916.8	1,834	2,750	3,667	4,584	5,500	6,417	7,334	8,251
1.96	923.8	1,848	2,771	3,695	4,619	5,543	6,467	7,390	8,314
1.97	930.9	1,862	2,793	3,724	4,654	5,585	6,516	7,447	8,378
1.98	938.0	1,876	2,814	3,752	4,690	5,628	6,566	7,504	8,442
1.99	945.1	1,890	2,835	3,780	4,726	5,671	6,616	7,561	8,506
2.00	952.2	1,904	2,857	3,809	4,761	5,713	6,666	7,618	8,570

Table 21.—*Discharge in sec.-ft. of Cipolletti and suppressed, thin-edged rect. weirs, computed from* $Q = 3.367\,LH^{\frac{3}{2}}$—Continued.

Depth on crest (feet)	Length of weir in feet								
	100	200	300	400	500	600	700	800	900
2.1	1,024.5	2,049	3,074	4,098	5,123	6,147	7,172	8,196	9,221
2.2	1,098.4	2,197	3,296	4,394	5,493	6,592	7,690	8,789	9,887
2.3	1,174.2	2,349	3,523	4,697	5,872	7,046	8,220	9,395	10,569
2.4	1,251.7	2,504	3,755	5,007	6,259	7,510	8,762	10,014	11,266
2.5	1,330.8	2,662	3,992	5,323	6,654	7,985	9,316	10,646	11,977
2.6	1,411.6	2,823	4,234	5,646	7,057	8,469	9,880	11,291	12,703
2.7	1,493.8	2,987	4,481	5,975	7,468	8,962	10,455	11,949	13,443
2.8	1,577.4	3,155	4,732	6,310	7,887	9,464	11,042	12,619	14,196
2.9	1,662.6	3,325	4,988	6,651	8,313	9,976	11,638	13,301	14,964
3.0	1,749.1	3,499	5,248	6,997	8,747	10,496	12,246	13,995	15,744
3.1	1,837.0	3,675	5,513	7,350	9,188	11,025	12,863	14,700	16,538
3.2	1,927.2	3,854	5,782	7,709	9,636	11,563	13,490	15,418	17,345
3.3	2,018.2	4,036	6,055	8,073	10,091	12,109	14,128	16,146	18,164
3.4	2,110.7	4,221	6,332	8,443	10,553	12,664	14,775	16,885	18,996
3.5	2,204.5	4,409	6,613	8,818	11,022	13,227	15,431	17,636	19,840
3.6	2,299.6	4,599	6,899	9,198	11,498	13,798	16,097	18,397	20,696
3.7	2,396.1	4,792	7,188	9,584	11,980	14,377	16,773	19,169	21,565
3.8	2,493.9	4,988	7,482	9,975	12,469	14,963	17,457	19,951	22,445
3.9	2,593.0	5,186	7,779	10,372	12,965	15,558	18,151	20,744	23,337
4.0	2,693.3	5,387	8,080	10,773	13,467	16,160	18,853	21,547	24,240
4.1	2,795.0	5,590	8,385	11,180	13,975	16,770	19,565	22,360	25,155
4.2	2,897.8	5,796	8,694	11,591	14,489	17,387	20,285	23,183	26,081
4.3	3,001.9	6,004	9,006	12,008	15,010	18,012	21,014	24,016	27,018
4.4	3,107.3	6,215	9,322	12,429	15,536	18,644	21,751	24,858	27,965
4.5	3,213.8	6,428	9,641	12,855	16,069	19,283	22,497	25,710	28,924
4.6	3,321.5	6,643	9,965	13,286	16,608	19,929	23,251	26,572	29,894
4.7	3,430.4	6,861	10,291	13,722	17,152	20,583	24,013	27,443	30,874
4.8	3,540.5	7,081	10,621	14,162	17,702	21,243	24,783	28,324	31,864
4.9	3,651.7	7,303	10,955	14,607	18,258	21,910	25,562	29,214	32,865
5.0	3,764.0	7,528	11,292	15,056	18,820	22,584	26,348	30,112	33,876
5.5	4,342.5	8,685	13,028	17,370	21,713	26,055	30,398	34,740	39,083
6.0	4,948.9	9,896	14,844	19,792	24,740	29,688	34,636	39,584	44,532
6.5	5,579.2	11,158	16,738	22,317	27,896	33,475	39,054	44,633	50,213
7.0	6,235.2	12,470	18,705	24,941	31,176	37,411	43,646	49,881	56,116
7.5	6,915.8	13,830	20,745	27,660	34,575	41,490	48,405	55,320	62,235
8.0	7,617.9	15,236	22,854	30,472	38,090	45,707	53,325	60,943	68,561
8.5	8,343.1	16,686	25,029	33,372	41,716	50,059	58,402	66,745	75,088
9.0	9,090.9	18,180	27,270	36,360	45,450	54,540	63,630	72,720	81,810
9.5	9,857.9	19,716	29,574	39,432	49,290	59,148	69,006	78,863	88,721
10	10,646.2	21,293	31,939	42,585	53,232	63,878	74,524	85,171	96,817
11	12,282.8	24,565	36,848	49,130	61,413	73,695	85,978	98,260	110,543
12	13,995.0	27,990	41,985	55,980	69,975	83,970	97,965	111,960	125,955
13	15,780.3	31,561	47,341	63,121	78,902	94,682	110,462	126,242	142,023
14	17,635.7	35,271	52,907	70,543	88,178	105,814	123,450	141,085	158,721
15	19,558.8	39,117	58,676	78,234	97,793	117,351	136,910	156,469	176,027
16	21,546.7	43,093	64,640	86,187	107,733	129,280	150,827	172,373	193,920
17	23,597.9	47,196	70,794	94,392	117,990	141,587	165,185	188,783	212,381
18	25,710.4	51,421	77,131	102,842	128,552	154,262	179,973	205,683	231,394
19	27,882.4	55,765	83,647	111,530	139,412	167,295	195,177	223,060	250,942
20	30,113.4	60,225	90,338	120,450	150,562	180,674	210,787	240,899	271,011

Table 21 is not accurate for heads of water on the weir crest greater than one-third its length. Where velocity of approach exists, before taking out the discharge the measured head on the weir crest in Table 21 should be increased by 1.5 times h, the velocity of approach head computed from $v^2 \div 2g$ where v is the velocity of approach in feet per second and g is gravity.

The discharges for thin edged rectangular weirs with end contractions can be obtained from Table 21 by multiplying the appropriate tabular discharges therein by $(L - 0.2\ H) \div L$ where L is the crest length and H is the water depth on the crest, each in feet.

The discharges for thin edged suppressed submerged weirs can be obtained from Table 21 with fair accuracy by multiplying the appropriate value of the depth of water on the weir crest therein by the proper values of the coefficient *n* selected from the tabulation below before taking out the discharges. In this tabulation D equals the head of water on the weir crest on the upstream side thereof and *d* equals the head of water thereon on the downstream side thereof.

Table 22.—*Herschel's coefficient n for submerged weirs*

$\frac{d}{D}$	0.0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	1.000	1.004	1.006	1.006	1.007	1.007	1.007	1.006	1.006	1.005
.1	1.005	1.003	1.002	1.000	.998	.996	.994	.992	.989	.987
.2	.985	.982	.980	.977	.975	.972	.970	.967	.964	.961
.3	.959	.956	.953	.950	.947	.944	.941	.938	.935	.932
.4	.929	.926	.922	.919	.915	.912	.908	.904	.900	.896
.5	.892	.888	.884	.880	.875	.871	.866	.861	.856	.851
.6	.846	.841	.836	.830	.824	.818	.813	.806	.800	.794
.7	.787	.780	.773	.766	.758	.750	.742	.732	.723	.714
.8	.703	.692	.681	.669	.656	.644	.631	.618	.604	.590
.9	.574	.557	.589	.520	.498	.471	.441	.402	.352	.275

Table 23.—*Discharge per foot of length over sharp-crested vertical weirs without end contractions.*[a]

[Computed from the formula $Q=\left(0.405+\frac{.00984}{h}\right)\left(1+0.55\frac{h^2}{(p+h)^2}\right)Lh\sqrt{2gh}$

(h=observed head, in feet; p=height of weir, in feet; L=length of crest, in feet; Q=discharge in second-feet.)]

h \ p	2	4	6	8	10	20	∞
0.1	0.13	0.13	0.13	0.13	0.13	0.13	0.13
0.2	.33	.33	.33	.33	.33	.33	.33
0.3	.58	.58	.58	.58	.58	.58	.58
0.4	.88	.88	.87	.87	.87	.87	.87
0.5	1.23	1.21	1.21	1.21	1.21	1.20	1.20
0.6	1.62	1.59	1.58	1.58	1.57	1.57	1.57
0.7	2.04	1.99	1.98	1.98	1.97	1.97	1.97
0.8	2.50	2.43	2.41	2.41	2.40	2.40	2.40
0.9	3.00	2.90	2.88	2.86	2.86	2.85	2.85
1.0	3.53	3.40	3.36	3.35	3.34	3.33	3.33
1.1	4.10	3.93	3.88	3.86	3.85	3.84	3.83
1.2	4.69	4.48	4.42	4.40	4.38	4.36	4.36
1.3	5.32	5.07	4.99	4.96	4.94	4.92	4.91
1.4	5.99	5.68	5.58	5.55	5.52	5.49	5.48
1.5	6.69	6.30	6.20	6.16	6.13	6.08	6.07
1.6	7.40	6.97	6.84	6.78	6.75	6.69	6.68
1.7	8.15	7.66	7.50	7.43	7.39	7.33	7.31
1.8	8.93	8.37	8.18	8.09	8.05	7.98	7.96
1.9	9.74	9.11	8.89	8.79	8.74	8.65	8.63
2.0	10.58	9.87	9.62	9.51	9.44	9.34	9.32
2.1	11.44	10.65	10.37	10.24	10.17	10.05	10.02
2.2	12.33	11.46	11.14	10.99	10.91	10.78	10.75
2.3	13.25	12.29	11.93	11.77	11.67	11.52	11.48
2.4	14.20	13.15	12.75	12.56	12.45	12.28	12.24
2.5	15.18	14.03	13.59	13.37	13.25	13.06	13.02
2.6	16.17	14.92	14.44	14.20	14.07	13.85	13.80
2.7	17.19	15.84	15.31	15.05	14.90	14.65	14.60
2.8	18.23	16.79	16.21	15.92	15.76	15.48	15.42
2.9	19.29	17.75	17.12	16.81	16.63	16.32	16.25
3.0	20.38	18.74	18.06	17.71	17.52	17.18	17.10
3.1	21.50	19.74	19.01	18.64	18.42	18.05	17.96
3.2	22.64	20.77	19.98	19.58	19.34	18.93	18.83
3.3	23.80	21.82	20.98	20.54	20.28	19.83	19.72
3.4	24.98	22.89	21.99	21.52	21.24	20.75	20.63
3.5	26.20	23.98	23.01	22.51	22.22	21.69	21.55
3.6	27.42	25.09	24.06	23.52	23.20	22.62	22.48
3.7	28.67	26.23	25.13	24.55	24.21	23.58	23.43
3.8	29.94	27.38	26.22	25.60	25.23	24.56	24.39
3.9	31.23	28.55	27.32	26.66	26.27	25.54	25.37
4.0	32.54	29.74	28.45	27.74	27.32	26.55	26.35
4.1	33.87	30.96	29.59	28.84	28.39	27.56	27.34
4.2	35.22	32.18	30.75	29.96	29.48	28.59	28.35
4.3	36.59	33.43	31.92	31.09	30.58	29.63	29.38
4.4	37.99	34.70	33.12	32.24	31.70	30.68	30.42

[a] This table should not be used where the weir is submerged, nor unless the overfalling sheet is aerated on the downstream face of the weir. If a vacuum forms under the falling sheet the discharge may be 5 per cent greater than given in this table. This table is not accurate for values of h greater than one-third L.

Table 28.—*Discharge per foot of length over sharp-crested vertical weirs without end contractions*—Continued.

h \ p	2	4	6	8	10	20	30
4.5	39.40	35.98	34.33	33.40	32.83	31.74	31.47
4.6	40.83	37.29	35.56	34.58	33.98	32.82	32.53
4.7	42.28	38.61	36.80	35.78	35.14	33.92	33.61
4.8	43.75	39.96	38.07	37.00	36.32	35.04	34.70
4.9	45.23	41.32	39.35	38.23	37.52	36.17	35.80
5.0	46.73	42.69	40.65	39.48	38.74	37.21	36.91
5.1	48.25	44.09	41.96	40.73	39.97	38.45	38.03
5.2	49.79	45.50	43.29	42.01	41.20	39.61	39.17
5.3	51.36	46.93	44.64	43.30	42.45	40.78	40.31
5.4	52.94	48.38	46.00	44.60	43.71	41.96	41.47
5.5	54.54	49.85	47.38	45.93	45.00	43.16	42.64
5.6	56.15	51.34	48.79	47.27	46.31	44.38	43.83
5.7	57.78	52.83	50.19	48.62	47.62	45.60	45.02
5.8	59.42	54.34	51.62	49.99	48.94	46.83	46.22
5.9	61.09	55.88	53.07	51.38	50.29	48.08	47.44
6.0	62.77	57.43	54.53	52.78	51.64	49.34	48.67
6.1	64.46	59.00	56.00	54.20	53.02	50.61	49.91
6.2	66.18	60.58	57.50	55.63	54.40	51.90	51.16
6.3	67.91	62.18	59.01	57.07	55.80	53.20	52.42
6.4	69.65	63.79	60.53	58.53	57.22	54.50	53.70
6.5	71.42	65.42	62.07	60.01	58.65	55.82	54.98
6.6	73.19	67.07	63.63	61.50	60.09	57.16	56.27
6.7	74.99	68.74	65.20	63.00	61.55	58.50	57.58
6.8	76.80	70.42	66.78	64.53	63.02	59.96	58.90
6.9	78.62	72.11	68.38	66.06	64.50	61.23	60.22
7.0	80.46	73.82	70.00	67.60	66.00	62.61	61.56
7.1	82.32	75.55	71.63	69.17	67.52	64.00	62.91
7.2	84.18	77.29	73.28	70.74	69.04	65.40	64.27
7.3	86.07	79.04	74.94	72.34	70.58	66.81	65.64
7.4	87.97	80.81	76.61	73.94	72.14	68.24	67.02
7.5	89.89	82.60	78.30	75.56	73.70	69.68	68.41
7.6	91.82	84.40	80.01	77.19	75.28	71.13	69.81
7.7	93.76	86.22	81.73	78.84	76.88	72.59	71.23
7.8	95.72	88.05	83.46	80.50	78.48	74.06	72.65
7.9	97.70	89.90	85.21	82.18	80.11	75.55	74.09
8.0	99.68	91.75	86.97	83.87	81.74	77.04	75.53
8.1	101.69	93.63	88.75	85.57	83.39	78.55	76.98
8.2	103.70	95.51	90.54	87.29	85.25	80.06	78.44
8.3	105.73	97.42	92.34	89.02	86.72	81.59	79.92
8.4	107.78	99.34	94.16	90.76	88.41	83.13	81.40
8.5	109.84	101.27	96.00	92.52	90.11	84.69	82.90
8.6	111.91	103.21	97.84	94.29	91.82	86.25	84.41
8.7	113.99	105.17	99.70	96.07	93.55	87.82	85.92
8.8	116.09	107.14	101.57	97.87	95.28	89.40	87.44
8.9	118.20	109.13	103.46	99.68	97.04	91.00	88.98
9.0	120.33	111.13	105.36	101.50	98.80	92.61	90.52
9.1	122.47	113.15	107.28	103.34	100.58	94.23	92.08
9.2	124.62	115.18	109.21	105.19	102.37	95.86	93.65
9.3	126.79	117.22	111.15	107.06	104.17	97.49	95.22
9.4	128.97	119.27	113.10	108.93	105.99	99.14	96.80
9.5	131.16	121.34	115.07	110.82	107.82	100.80	98.40
9.6	133.36	123.42	117.05	112.72	109.65	102.48	100.00
9.7	135.58	125.51	119.04	114.64	111.50	104.16	101.62
9.8	137.82	127.63	121.05	116.57	113.37	105.85	103.25
9.9	140.06	129.74	123.07	118.51	115.25	107.56	104.88
10.0	142.31	131.87	125.10	120.46	117.14	109.27	106.52

Table 24.—*Multipliers for broad-crested weirs of rectangular cross section (Type a, fig. 2)*

[p=height of weir; c=width of crest; h=observed head; all in feet.]

p	4.6	4.6	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25
c	2.6	6.6	.48	.93	1.65	3.17	5.88	8.98	12.24	16.30
h										
0.5	.....	.....	.821	.792	.806	.792	.799	.801	.786	.790
1.0	.765	.708	.997	.899	.808	.795	.791	.794	.815	.790
1.5	.789	.709	1.00	.982	.878	.796	.796	.793	.814	.792
2.0	.814	.710	1.00	1.00	.906	.815	.797	.792	.797	.793
2.5	.835	.711	1.00	1.00	.985	.844	.797	.790	.796	.793
3.0	.857	.711	1.00	1.00	1.00	.870	.797	.788	.794	.791
3.5	.878	.712	1.00	1.00	1.00	.90	.812	.787	.794	.791
4.0	.899	.714	1.00	1.00	1.00	.93	.834	.786	.792	.789
5.0	.940	.716	1.00	1.00	1.00	.97	(a)	.78	.79	.78
6.0	.986	.718	1.00	1.00	1.00	.98	(a)	.78	.78	.78
7.0	.....	.....	1.00	1.00	1.00	(a)	(a)	.77	.78	.77
8.0	.....	.....	1.00	1.00	1.00	(a)	(a)	.77	.77	.77
9.0	.....	.....	1.00	1.00	1.00	(a)	(a)	.77	.77	.77
10.0	.....	.....	1.00	1.00	1.00	(a)	(a)	.77	.77	.77

a Value doubtful.

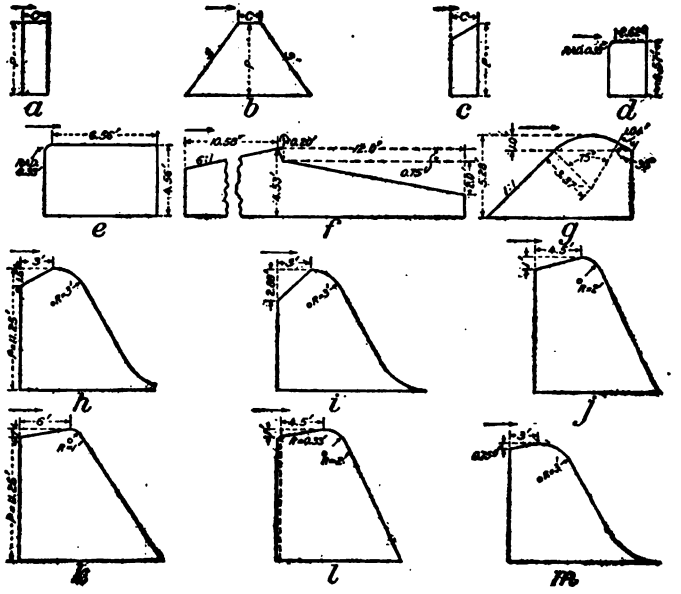


FIG. 2.—Types of weirs.

Table 25.—*Multipliers for weirs of trapezoidal cross section.*

[p=height of weir, in feet; c=width of crest, in feet; s=upstream slope; s'=downstream slope; h=observed head, in feet.]

	Type *b*, fig. 2							Type *c*, fig. 2	
p	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.65	11.25
c	.33	.66	.66	.66	.66	.33	.66	7.00	6.00
s	2:1	2:1	3:1	4:1	5:1	2:1	2:1	4.67:1	6:1
s'	0	0	0	0	0	5:1	2:1	.....	.....
h									
1.0	1.137	1.048	1.066	1.039	1.009	1.095	1.071	1.042	1.060
1.5	1.131	1.068	1.066	1.039	1.009	1.071	1.066	1.033	1.069
2.0	1.120	1.080	1.061	1.033	1.005	1.044	1.053	1.024	1.054
2.5	1.106	1.085	1.052	1.026	.997	1.024	1.047	1.012	1.012
3.0	1.094	1.088	1.047	1.020	.991	1.009	1.047	.995	.985
3.5	1.085	1.087	1.043	1.017	.988	1.003	1.050	.983	.979
4.0	1.072	1.084	1.038	1.012	.984	1.014	1.052	.977	.976
4.5	1.064	1.081	1.035	1.009	.980	1.023	1.055	.974	.973
5.0	.....	.....	.....	.....	.....	.....	.....	.97	.97
6.0	.....	.....	.....	.....	.....	.....	.....	.97	.96
7.0	.....	.....	.....	.....	.....	.....	.....	.97	.96
8.0	.....	.....	.....	.....	.....	.....	.....	.96	.95
9.0	.....	.....	.....	.....	.....	.....	.....	.96	.95
10.0	.....	.....	.....	.....	.....	.....	.....	.96	.95

Table 26.—*Multipliers for compound weirs.*

[p=height of weir, in feet; h=observed head, in feet.]

p	4.57	4.56	4.53	5.28	11.25	11.25	11.25	11.25	11.25	11.25
Type, fig. 2.	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*
h										
0.5	.....	.....	.....	.....	.941	.924	.933	.962	.971	.947
1.0	.842	.836	.929	.976	1.039	1.033	.988	1.045	1.033	1.000
1.5	.866	.834	.950	.979	1.087	1.093	1.018	1.066	1.042	1.036
2.0	.888	.831	.953	.988	1.109	1.133	1.033	1.063	1.035	1.063
2.5	.906	.826	.947	1.000	1.118	1.153	1.045	1.020	1.033	1.085
3.0	.927	.822	.942	1.016	1.120	1.163	1.054	.997	1.045	1.096
3.5	.945	.817	.936	1.032	1.127	1.169	1.060	.994	1.054	1.108
4.0	.965	.812	.931	1.044	1.123	1.165	1.060	.991	1.057	1.110
5.0	1.00	.80	.92	1.05	1.11	1.16	1.05	.98	1.05	1.10
6.0	.....	.....	.....	.....	1.11	1.15	1.04	.98	1.04	1.10
7.0	.....	.....	.....	.....	1.10	1.14	1.04	.97	1.04	1.09
8.0	.....	.....	.....	.....	1.10	1.14	1.04	.97	1.03	1.09
9.0	.....	.....	.....	.....	1.09	1.14	1.03	.97	1.03	1.08
10.0	.....	.....	.....	.....	1.09	1.13	1.03	.97	1.03	1.08

Table 27.—*Discharge of standard rectangular submerged orifices in cubic feet per second, computed from the formula* $Q=0.61\sqrt{2gH}\,A$.

Head H, feet	Cross-sectional area A of orifice, square feet							
	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.01	0.122	0.245	0.367	0.489	0.611	0.734	0.856	0.978
.02	0.173	0.346	0.518	0.691	0.864	1.037	1.210	1.382
.03	0.212	0.424	0.635	0.847	1.059	1.271	1.483	1.694
.04	0.245	0.489	0.734	0.978	1.223	1.468	1.712	1.957
.05	0.273	0.547	0.820	1.093	1.367	1.640	1.913	2.186
.06	0.300	0.599	0.899	1.198	1.497	1.797	2.097	2.396
.07	0.324	0.647	0.971	1.294	1.617	1.941	2.265	2.588
.08	0.346	0.691	1.037	1.383	1.729	2.074	2.420	2.766
.09	0.367	0.734	1.101	1.468	1.835	2.201	2.568	2.935
.10	0.387	0.773	1.160	1.547	1.933	2.320	2.707	3.094
.11	0.406	0.811	1.217	1.622	2.027	2.433	2.839	3.244
.12	0.424	0.847	1.271	1.694	2.118	2.542	2.965	3.389
.13	0.441	0.882	1.323	1.764	2.205	2.646	3.086	3.527
.14	0.458	0.915	1.373	1.830	2.287	2.745	3.203	3.660
.15	0.474	0.947	1.421	1.895	2.369	2.842	3.316	3.790
.16	0.489	0.978	1.467	1.956	2.445	2.934	3.423	3.912
.17	0.504	1.008	1.512	2.016	2.520	3.024	3.528	4.032
.18	0.519	1.037	1.556	2.075	2.593	3.112	3.631	4.150
.19	0.533	1.066	1.599	2.132	2.665	3.198	3.731	4.264
.20	0.547	1.094	1.641	2.188	2.735	3.282	3.829	4.376
.21	0.561	1.120	1.681	2.241	2.801	3.361	3.921	4.482
.22	0.574	1.148	1.722	2.296	2.870	3.444	4.018	4.592
.23	0.587	1.172	1.759	2.345	2.931	3.517	4.103	4.690
.24	0.600	1.198	1.797	2.396	2.995	3.899	4.193	4.792
.25	0.612	1.223	1.834	2.446	3.057	3.668	4.280	4.891
.26	0.624	1.247	1.871	2.494	3.117	3.741	4.365	4.988
.27	0.636	1.270	1.906	2.541	3.176	3.811	4.446	5.082
.28	0.646	1.294	1.942	2.589	3.236	3.883	4.530	5.178
.29	0.659	1.319	1.978	2.638	3.297	3.956	4.616	5.276
.30	0.670	1.339	2.009	2.678	3.347	4.017	4.687	5.356
.31	0.681	1.363	2.045	2.726	3.407	4.089	4.771	5.452
.32	0.692	1.382	2.073	2.764	3.455	4.146	4.837	5.528
.33	0.703	1.405	2.107	2.810	3.513	4.215	4.917	5.620
.34	0.713	1.426	2.139	2.852	3.565	4.278	4.991	5.704
.35	0.724	1.446	2.169	2.892	3.615	4.338	5.061	5.784
.36	0.734	1.467	2.201	2.934	3.667	4.401	5.135	5.868
.37	0.745	1.488	2.232	2.976	3.720	4.464	5.208	5.952
.38	0.754	1.508	2.262	3.015	3.770	4.524	5.278	6.032
.39	0.764	1.527	2.291	3.054	3.818	4.582	5.345	6.109
0.40	0.774	1.547	2.321	3.094	3.867	4.641	5.415	6.188

Table 27.—*Discharge of standard rectangular submerged orifices in cubic feet per second, computed from the formula* $Q=0.61\sqrt{2gH}\ A$—Continued.

Head H, feet	Cross-sectional area A of orifice, square feet							
	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.41	0.783	1.567	2.350	3.133	3.917	4.700	5.483	6.266
.42	0.792	1.585	2.377	3.170	3.962	4.754	5.547	6.339
.43	0.802	1.604	2.406	3.208	4.010	4.812	5.614	6.416
.44	0.811	1.622	2.433	3.244	4.055	4.866	5.677	6.488
.45	0.820	1.640	2.461	3.281	4.101	4.921	5.741	6.562
.46	0.829	1.659	2.489	3.318	4.147	4.977	5.807	6.636
.47	0.839	1.678	2.517	3.356	4.195	5.035	5.874	6.713
.48	0.847	1.695	2.542	3.389	4.237	5.084	5.931	6.778
.49	0.856	1.712	2.568	3.424	4.280	5.136	5.992	6.848
.50	0.865	1.729	2.594	3.458	4.323	5.188	6.052	6.917
.51	0.873	1.746	2.620	3.493	4.366	5.239	6.112	6.986
.52	0.882	1.763	2.645	3.527	4.409	5.290	6.172	7.054
.53	0.890	1.780	2.670	3.560	4.451	5.341	6.231	7.121
.54	0.898	1.797	2.695	3.593	4.491	5.390	6.288	7.186
.55	0.907	1.813	2.719	3.626	4.533	5.439	6.345	7.252
.56	0.915	1.830	2.745	3.660	4.575	5.490	6.405	7.320
.57	0.923	1.846	2.769	3.692	4.615	5.538	6.461	7.384
.58	0.931	1.862	2.794	3.725	4.656	5.587	6.518	7.450
.59	0.939	1.879	2.818	3.757	4.697	5.636	6.575	7.514
.60	0.947	1.895	2.842	3.790	4.737	5.684	6.632	7.579
.61	0.955	1.910	2.865	3.820	4.775	5.730	6.685	7.640
.62	0.963	1.925	2.887	3.850	4.812	5.775	6.737	7.700
.63	0.971	1.941	2.911	3.882	4.853	5.823	6.793	7.764
.64	0.978	1.956	2.934	3.912	4.890	5.868	6.846	7.824
.65	0.986	1.972	2.958	3.944	4.930	5.916	6.902	7.888
.66	0.993	1.987	2.980	3.974	4.967	5.960	6.954	7.947
.67	1.001	2.002	3.003	4.004	5.005	6.006	7.007	8.006
.68	1.008	2.016	3.024	4.032	5.040	6.048	7.056	8.064
.69	1.016	2.032	3.048	4.064	5.080	6.096	7.112	8.128
.70	1.023	2.046	3.069	4.092	5.115	6.138	7.161	8.184
.71	1.031	2.062	3.093	4.124	5.155	6.186	7.217	8.248
.72	1.038	2.076	3.114	4.152	5.190	6.228	7.266	8.304
.73	1.045	2.090	3.135	4.180	5.225	6.270	7.315	8.360
.74	1.052	2.104	3.158	4.210	5.260	6.311	7.369	8.421
.75	1.059	2.118	3.178	4.237	5.296	6.355	7.413	8.475
.76	1.066	2.132	3.198	4.264	5.330	6.396	7.462	8.528
.77	1.072	2.145	3.217	4.290	5.362	6.434	7.507	8.579
.78	1.080	2.160	3.240	4.320	5.400	6.480	7.560	8.640
.79	1.087	2.174	3.261	4.348	5.435	6.522	7.609	8.696
0.80	1.094	2.188	3.282	4.376	5.470	6.564	7.658	8.752

Table 28.—*Coefficients C to be applied to a discharge given by Table 27 to give the discharge of the same orifice suppressed, computed from the formula* $C = 1 + 0.15\,r$.

d=height of orifice, in feet.
l=length of orifice, in feet.
r=ratio of suppressed perimeter to total perimeter.

Size of orifice			Bottom suppressed		Bottom and sides suppressed	
d, feet	*l*, feet	*A*, square feet	*r*	*C*	*r*	*C*
0.25	1.0	0.25	0.40	1.06	0.60	1.09
	2.0	.50	.44	1.07	.56	1.08
	3.0	.75	.46	1.07	.54	1.08
0.5	1.0	.50	.33	1.05	.67	1.10
	1.5	.75	.37	1.06	.63	1.09
	2.0	1.00	.40	1.06	.60	1.09
	2.5	1.25	.42	1.06	.58	1.09
	3.0	1.50	.43	1.06	.57	1.09
0.75	1.33	1.00	.32	1.05	.68	1.10
	1.67	1.25	.34	1.05	.66	1.10
	2.00	1.50	.36	1.05	.64	1.10
	2.33	1.75	.38	1.06	.62	1.09
	2.67	2.00	0.39	1.06	0.61	1.09

EXAMPLE: To find the discharge of a standard submerged rectangular orifice 0.5 by 2.5 feet with bottom and side suppressions under a head of 0.18 feet.

For an area of 1.25 square feet (=0.5×2.5) and a head of 0.18 feet, Table 27 gives a discharge of 2.593 second-feet. For a height, *d*, of 0.5 feet and a length, *l*, of 2.5 feet, with bottom and sides suppressed, Table 28 gives a coefficient of 1.09. Then 2.593×1.09=2.826 second-feet, the discharge desired.

Table 29.—*Flow of water in second feet, and velocity in feet per second in* **wood stave pipe** *in good condition having ordinarily smooth alignment and profile based on the formula*

$$H=\frac{7.68\ V^{1.8}}{d^{1.17}}.$$

H=friction head per 1,000 feet.
V=velocity in feet per second.
d=diameter of pipe in inches.

Diameter in inches	Diameter in feet	Area, square feet	Friction head, in feet per 1,000 feet length of pipe									
			0.2		0.3		0.4		0.5		0.6	
			Q	*V*	*Q*	*V*	*Q*	*V*	*Q*	*V*	*Q*	*V*
6	0.500	0.196	0.08	0.41	0.10	0.51	0.12	0.61	0.14	0.71	0.15	0.76
8	0.667	0.349	0.18	0.52	0.22	0.63	0.26	0.75	0.30	0.86	0.33	0.95
10	0.833	0.545	0.32	0.59	0.40	0.74	0.47	0.86	0.53	0.97	0.59	1.08
12	1.000	0.785	0.52	0.66	0.65	0.83	0.76	0.97	0.87	1.11	0.96	1.22
14	1.167	1.069	0.78	0.73	0.98	0.92	1.15	1.08	1.30	1.22	1.44	1.35
16	1.333	1.396	1.12	0.80	1.40	1.00	1.64	1.17	1.86	1.33	2.05	1.47
18	1.500	1.767	1.53	0.87	1.91	1.08	2.24	1.27	2.54	1.44	2.81	1.59
20	1.667	2.182	2.02	0.93	2.53	1.16	2.96	1.36	3.35	1.54	3.71	1.70
22	1.833	2.640	2.60	0.98	3.25	1.23	3.81	1.44	4.32	1.64	4.78	1.81
24	2.000	3.142	3.27	1.04	4.09	1.30	4.80	1.53	5.44	1.73	6.02	1.92
26	2.167	3.687	4.04	1.10	5.06	1.37	5.94	1.61	6.72	1.82	7.44	2.02
28	2.333	4.276	4.92	1.15	6.16	1.44	7.23	1.69	8.18	1.91	9.05	2.12
30	2.500	4.909	5.91	1.20	7.40	1.51	8.68	1.77	9.82	2.00	10.9	2.22
32	2.667	5.585	7.01	1.25	8.78	1.57	10.3	1.84	11.7	2.09	12.9	2.31
34	2.833	6.305	8.23	1.30	10.3	1.63	12.1	1.92	13.7	2.17	15.1	2.40
36	3.000	7.069	9.57	1.35	12.0	1.70	14.1	1.99	15.9	2.25	17.6	2.49
38	3.167	7.876	11.0	1.40	13.8	1.75	16.2	2.06	18.4	2.34	20.3	2.58
40	3.333	8.727	12.7	1.46	15.9	1.82	18.6	2.13	21.1	2.42	23.3	2.67
42	3.500	9.621	14.4	1.50	18.0	1.87	21.2	2.20	24.0	2.49	26.5	2.75
44	3.667	10.56	16.3	1.54	20.4	1.93	23.9	2.26	27.1	2.57	30.0	2.84
46	3.833	11.54	18.3	1.59	23.0	1.99	26.9	2.33	30.5	2.64	33.7	2.92
48	4.000	12.57	20.5	1.63	25.7	2.05	30.2	2.40	34.1	2.71	37.8	3.01
50	4.167	13.64	22.9	1.68	28.6	2.10	33.6	2.46	38.0	2.79	42.1	3.09
52	4.333	14.75	25.4	1.72	31.8	2.16	37.3	2.53	42.2	2.86	46.8	3.17
54	4.500	15.90	28.0	1.76	35.1	2.21	41.2	2.59	46.6	2.93	51.6	3.24
56	4.667	17.10	30.9	1.81	38.7	2.26	45.4	2.65	51.3	3.00	56.8	3.32
58	4.833	18.35	33.9	1.85	42.4	2.31	49.8	2.71	56.3	3.07	62.3	3.40
60	5.000	19.64	37.1	1.89	46.4	2.36	54.5	2.78	61.6	3.14	68.2	3.47
66	5.5	23.76	47.7	2.01	59.8	2.52	70.1	2.95	79.4	3.34	87.8	3.70
72	6.0	28.27	60.1	2.13	75.3	2.66	88.3	3.12	99.9	3.53	111	3.93
78	6.5	33.18	74.3	2.24	93.0	2.80	109	3.29	124	3.74	137	4.13
84	7.0	38.48	90.4	2.35	113	2.94	133	3.46	150	3.90	166	4.31
90	7.5	44.18	109	2.47	136	3.08	159	3.60	181	4.10	200	4.53
96	8.0	50.26	129	2.57	161	3.20	189	3.76	214	4.26	237	4.71
102	8.5	56.74	151	2.66	189	3.33	222	3.91	252	4.44	278	4.90
108	9.0	63.62	176	2.77	220	3.46	259	4.07	293	4.61	324	5.09
114	9.5	70.88	203	2.86	254	3.58	298	4.21	338	4.77	374	5.28
120	10.0	78.54	233	2.97	291	3.71	342	4.35	387	4.93	428	5.45

Table 29.—*Flow of water in second-feet, and velocity in feet per second in* **wood stave pipe** *in good condition having ordinarily smooth alignment and profile based on the formula*

$$H=\frac{7.68\ V^{1.8}}{d^{1.17}}$$.—Continued.

H=friction head per 1,000 feet.
V=velocity in feet per second.
d=diameter of pipe in inches.

Diameter, in inches	Friction head, in feet per 1,000 feet length of pipe											
	0.7		0.8		0.9		1.0		1.2		1.4	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.17	0.87	0.18	0.92	0.19	0.97	0.20	1.02	0.22	1.12	0.24	1.22
8	0.36	1.08	0.38	1.09	0.41	1.17	0.43	1.23	0.48	1.36	0.52	1.49
10	0.64	1.17	0.69	1.27	0.74	1.36	0.78	1.43	0.87	1.60	0.95	1.74
12	1.04	1.32	1.12	1.43	1.20	1.53	1.27	1.62	1.41	1.79	1.53	1.95
14	1.57	1.47	1.69	1.58	1.81	1.69	1.91	1.79	2.12	1.98	2.31	2.16
16	2.24	1.60	2.41	1.73	2.57	1.84	2.73	1.96	3.02	2.16	3.29	2.36
18	3.06	1.78	3.29	1.86	3.51	1.99	3.73	2.11	4.12	2.33	4.49	2.54
20	4.04	1.85	4.35	1.99	4.65	2.13	4.93	2.26	5.45	2.50	5.94	2.72
22	5.20	1.97	5.60	2.12	5.98	2.27	6.34	2.40	7.02	2.66	7.64	2.89
24	6.55	2.08	7.06	2.25	7.53	2.40	7.99	2.54	8.84	2.81	9.63	3.06
26	8.10	2.20	8.72	2.36	9.31	2.53	9.87	2.68	10.9	2.96	11.9	3.23
28	9.86	2.31	10.6	2.48	11.3	2.64	12.0	2.81	13.3	3.11	14.5	3.39
30	11.8	2.40	12.7	2.59	13.6	2.77	14.4	2.93	16.0	3.26	17.4	3.54
32	14.0	2.51	15.1	2.70	16.1	2.88	17.1	3.06	18.9	3.38	20.6	3.69
34	16.5	2.62	17.8	2.82	19.0	3.01	20.1	3.19	22.2	3.52	24.2	3.84
36	19.2	2.72	20.7	2.93	22.1	3.13	23.4	3.31	25.9	3.66	28.2	3.99
38	22.1	2.81	23.9	3.03	25.5	3.24	27.0	3.43	29.9	3.80	32.5	4.13
40	25.4	2.91	27.3	3.13	29.2	3.35	30.9	3.54	34.2	3.92	37.3	4.27
42	28.9	3.00	31.1	3.23	33.2	3.45	35.2	3.66	38.9	4.04	42.4	4.41
44	32.7	3.10	35.2	3.33	37.6	3.56	39.8	3.77	44.0	4.17	48.0	4.55
46	36.7	3.18	39.6	3.43	42.2	3.66	44.8	3.88	49.6	4.30	54.0	4.68
48	41.1	3.27	44.3	3.52	47.3	3.76	50.1	3.99	55.5	4.42	60.4	4.81
50	45.8	3.36	49.4	3.62	52.7	3.87	55.9	4.10	61.8	4.53	67.3	4.94
52	50.9	3.45	54.8	3.72	58.5	3.97	62.0	4.20	68.6	4.65	74.7	5.07
54	56.2	3.53	60.5	3.80	64.6	4.06	68.5	4.31	75.8	4.77	82.6	5.19
56	61.9	3.62	66.6	3.89	71.1	4.16	75.4	4.41	83.5	4.88	90.9	5.32
58	67.9	3.70	73.1	3.98	78.1	4.26	82.8	4.51	91.6	4.99	99.8	5.44
60	74.3	3.78	80.0	4.07	85.4	4.35	90.6	4.61	100	5.09	109	5.55
66	95.6	4.02	103	4.34	110	4.63	117	4.92	129	5.43	141	5.93
72	120	4.24	130	4.60	138	4.88	147	5.20	162	5.73	177	6.26
78	149	4.49	160	4.82	171	5.15	182	5.48	201	6.06	219	6.60
84	181	4.70	195	5.07	208	5.41	221	5.74	244	6.34	266	6.91
90	218	4.93	234	5.30	250	5.66	265	6.00	293	6.63	320	7.24
96	258	5.13	278	5.53	297	5.91	315	6.27	348	6.92	379	7.54
102	303	5.34	326	5.75	349	6.15	370	6.52	409	7.21	445	7.84
108	353	5.55	380	5.97	406	6.38	430	6.76	476	7.48	518	8.14
114	407	5.74	438	6.18	468	6.60	496	7.00	549	7.75	598	8.44
120	466	5.93	502	6.39	536	6.82	568	7.23	629	8.01	685	8.72

Table 29.—*Flow of water in second feet and velocity in feet per second in* **wood stave pipe** *in good condition having ordinarily smooth alignment and profile based on the formula*

$$H=\frac{7.68\,V^{1.8}}{d^{1.17}}$$

.—Continued.

H=friction head per 1,000 feet.
V=velocity in feet per second.
d=diameter of pipe in inches.

Diameter in inches	Friction head in feet per 1,000 feet length of pipe											
	1.6		1.8		2.0		2.5		3.0		4.0	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.26	1.32	0.28	1.42	0.30	1.53	0.34	1.73	0.37	1.88	0.44	2.24
8	0.56	1.60	0.60	1.72	0.64	1.83	0.72	2.06	0.80	2.29	0.94	2.69
10	1.02	1.87	1.09	2.00	1.15	2.11	1.31	2.40	1.44	2.64	1.69	3.10
12	1.65	2.10	1.76	2.24	1.87	2.38	2.12	2.70	2.34	2.98	2.75	3.50
14	2.49	2.33	2.65	2.48	2.81	2.63	3.18	2.97	3.52	3.29	4.13	3.86
16	3.54	2.54	3.78	2.71	4.01	2.87	4.54	3.25	5.02	3.60	5.89	4.22
18	4.84	2.74	5.16	2.92	5.48	3.10	6.20	3.51	6.86	3.88	8.04	4.55
20	6.40	2.93	6.83	3.13	7.24	3.32	8.19	3.75	9.07	4.16	10.6	4.86
22	8.23	3.12	8.79	3.33	9.32	3.53	10.5	3.98	11.7	4.43	13.7	5.19
24	10.4	3.31	11.1	3.53	11.7	3.72	13.3	4.23	14.7	4.68	17.2	5.47
26	12.8	3.47	13.7	3.71	14.5	3.93	16.4	4.45	18.2	4.94	21.3	5.78
28	15.6	3.65	16.7	3.90	17.7	4.14	20.0	4.68	22.1	5.17	25.9	6.06
30	18.7	3.81	20.0	4.07	21.2	4.32	24.0	4.89	26.5	5.40	31.1	6.34
32	22.2	3.98	23.7	4.24	25.2	4.51	28.5	5.10	31.5	5.64	37.0	6.62
34	26.1	4.14	27.9	4.42	29.5	4.68	33.4	5.30	37.0	5.87	43.4	6.88
36	30.4	4.30	32.4	4.58	34.4	4.87	38.9	5.50	43.0	6.08	50.5	7.14
38	35.0	4.44	37.4	4.75	39.7	5.04	44.9	5.70	49.7	6.31	58.3	7.40
40	40.1	4.60	42.9	4.92	45.4	5.20	51.4	5.89	56.9	6.52	66.8	7.65
42	45.7	4.75	48.8	5.07	51.7	5.37	58.5	6.08	64.8	6.73	76.0	7.90
44	51.7	4.90	55.2	5.23	58.5	5.54	66.2	6.27	73.3	6.94	85.9	8.13
46	58.1	5.03	62.1	5.38	65.8	5.70	74.5	6.46	82.4	7.14	96.7	8.38
48	65.1	5.18	69.5	5.53	73.7	5.86	83.4	6.64	92.2	7.34	108	8.60
50	72.5	5.32	77.4	5.68	82.1	6.02	92.9	6.81	103	7.55	121	8.87
52	80.4	5.45	85.9	5.82	91.1	6.18	103	6.98	114	7.73	134	9.09
54	88.9	5.59	94.9	5.97	101	6.35	114	7.17	126	7.92	148	9.36
56	97.9	5.72	105	6.14	111	6.49	125	7.31	139	8.13	163	9.53
58	107	5.83	115	6.27	122	6.65	138	7.52	152	8.28	179	9.75
60	118	6.01	125	6.37	133	6.77	151	7.69	167	8.50	195	9.93
66	151	6.36	162	6.82	171	7.20	194	8.17	215	9.05	252	10.6
72	191	6.75	203	7.18	216	7.64	244	8.63	270	9.55	317	11.2
78	236	7.11	252	7.59	267	8.05	302	9.10	334	10.1	392	11.8
84	287	7.46	306	7.95	325	8.44	367	9.54	406	10.6	477	12.4
90	344	7.79	368	8.33	390	8.83	441	9.98	488	11.0	.....	.....
96	408	8.12	436	8.67	462	9.19	523	10.4	579	11.5	.....	.....
102	480	8.46	512	9.02	543	9.57	614	10.8	680	12.0	.....	.....
108	558	8.77	596	9.37	632	9.93	715	11.2	.....	.....	.....	.....
114	644	9.09	688	9.71	729	10.3	825	11.6	.....	.....	.....	.....
120	738	9.40	788	10.0	835	10.6	945	12.0	.....	.....	.....	.....

Table 29.—*Flow of water in second-feet and velocity in feet per second in* **wood stave pipe** *in good condition having ordinarily smooth alignment and profile based on the formula*

$$H=\frac{7.68\ V^{1.8}}{d^{1.17}}$$

—Continued.

H=friction head per 1,000 feet.
V=velocity in feet per second.
d=diameter of pipe in inches.

Diameter, in inches	Friction head, in feet per 1,000 feet length of pipe											
	5.0		6.0		7.0		8.0		9.0		10.0	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.50	2.55	0.55	2.80	0.60	3.06	0.65	3.28	0.69	3.51	0.73	3.72
8	1.06	3.04	1.17	3.35	1.28	3.67	1.38	3.95	1.47	4.21	1.56	4.47
10	1.92	3.52	2.12	3.89	2.31	4.24	2.49	4.57	2.66	4.88	2.82	5.17
12	3.11	3.96	3.44	4.38	3.75	4.77	4.04	5.14	4.31	5.49	4.57	5.82
14	4.68	4.38	5.18	4.85	5.64	5.28	6.07	5.68	6.48	6.06	6.87	6.43
16	6.66	4.77	7.37	5.28	8.03	5.75	8.65	6.19	9.23	6.61	9.79	7.01
18	9.10	5.15	10.1	5.72	11.0	6.22	11.8	6.68	12.6	7.13	13.4	7.58
20	12.0	5.50	13.3	6.10	14.5	6.65	15.6	7.15	16.7	7.65	17.7	8.11
22	15.5	5.87	17.1	6.48	18.7	7.08	20.1	7.61	21.5	8.14	22.8	8.64
24	19.5	6.21	21.6	6.88	23.5	7.48	25.3	8.05	27.0	8.59	28.7	9.13
26	24.1	6.54	26.7	7.24	29.1	7.89	31.3	8.49	33.4	9.06	35.4	9.60
28	29.4	6.88	32.5	7.60	35.4	8.28	38.1	8.91	40.7	9.52	43.1	10.1
30	35.2	7.17	39.0	7.95	42.5	8.66	45.8	9.33	48.8	9.94	51.8	10.6
32	41.8	7.49	46.3	8.29	50.4	9.02	54.3	9.72	58.0	10.4	61.4	11.0
34	49.1	7.79	54.3	8.61	59.2	9.39	63.8	10.1	68.1	10.8	72.2	11.4
36	57.1	8.08	63.2	8.94	68.9	9.75	74.2	10.5	79.2	11.2	84.0	11.9
38	65.9	8.37	73.0	9.27	79.5	10.1	85.6	10.9	91.4	11.6	96.9	12.3
40	75.6	8.66	83.6	9.58	91.1	10.4	98.1	11.2	105	12.0	.....	.....
42	86.0	8.94	95.1	9.89	104	10.8	112	11.6	119	12.4	.....	.....
48	122	9.71	136	10.8	148	11.8	159	12.6	.....	.....	.....	.....
54	167	10.5	185	11.6	202	12.7	.....	.....	.....	.....	.....	.....
60	221	11.3	245	12.5	.....	.....	.....	.....	.....	.....	.....	.....
66	285	12.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Diameter, in inches	Friction head, in feet per 1,000 feet length of pipe											
	12.5		15.0		17.5		20.0		25.0		30.0	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.82	4.18	0.91	4.63	0.99	5.04	1.07	5.45	1.21	6.16	1.34	6.82
8	1.77	5.07	1.95	5.59	2.13	6.10	2.29	6.56	2.59	7.42	2.87	8.22
10	3.19	5.85	3.53	6.47	3.84	7.04	4.14	7.59	4.69	8.60	5.18	9.50
12	5.17	6.58	5.72	7.28	6.23	7.93	6.71	8.54	7.60	9.68	8.40	10.7
14	7.78	7.28	8.61	8.05	9.38	8.77	10.1	9.45	11.4	10.7	12.6	11.8
16	11.1	7.95	12.3	8.81	13.4	9.60	14.4	10.3	16.3	11.7	18.0	12.9
18	15.1	8.55	16.8	9.51	18.2	10.3	19.7	11.1	22.2	12.6	.....	.....
20	20.0	9.17	22.1	10.1	24.1	11.0	26.0	11.9	.....	.....	.....	.....
22	25.8	9.77	28.5	10.8	31.1	11.8	33.4	12.7	.....	.....	.....	.....
24	32.5	10.3	35.9	11.4	39.1	12.4	.....	.....	.....	.....	.....	.....
26	40.1	10.9	44.4	12.0	.....	.....	.....	.....	.....	.....	.....	.....
28	48.8	11.4	54.0	12.6	.....	.....	.....	.....	.....	.....	.....	.....
30	58.6	11.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	69.5	12.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 30.—*Factors for solution of Scobey's formula for flow in concrete pipe.* $Q=0.00546\ C_s d^{2.625} H^{0.5}$

Q = discharge in cu. ft. per sec. d = diameter in inches
C_s = Scobey's coefficient* H = friction head per 1,000 ft.

d	0.00546 $C_s d^{2.625}$			H	$H^{0.5}$
	C_s=0.310	C_s=0.345	C_s=0.370		
6	0.1867	0.2078	.....	0.1	0.3162
8	0.3973	0.4422	.....	0.2	0.4472
				0.3	0.5477
10	0.7138	0.7944	.....	0.4	0.6325
12	1.1519	1.2819	.....	0.5	0.7071
14	1.7264	1.9213	.....	0.6	0.7746
16	2.4511	2.7279	2.9256	0.7	0.8367
18	3.3393	3.7162	3.9855	0.8	0.8944
				0.9	0.9487
20	4.4031	4.9002	5.2553	1.0	1.0000
22	5.6548	6.2932	6.7492		
24	7.1057	7.9080	8.4810	1.2	1.0954
26	8.7672	9.7570	10.464	1.4	1.1832
28	10.6500	11.852	12.711	1.6	1.2649
				1.8	1.3416
30	12.764	14.205	15.235	2.0	1.4142
32	15.121	16.828	18.047	2.2	1.4832
34	17.729	19.731	21.161	2.4	1.5492
36	20.599	22.925	24.586	2.6	1.6125
38	23.740	26.421	28.335	2.8	1.6733
				3.0	1.7321
40	27.162	30.229	32.419	3.2	1.7889
42	30.873	34.359	36.849	3.4	1.8439
44	34.883	38.822	41.635	3.6	1.8974
46	39.201	43.627	46.788	3.8	1.9494
48	43.834	48.783	52.318	4.0	2.0000
				4.2	2.0493
50	48.792	54.301	58.236	4.4	2.0976
52	54.083	60.189	64.551	4.6	2.1448
54	59.716	66.458	71.273	4.8	2.1909
56	65.697	73.115	78.413	5.0	2.2361
58	72.037	80.170	85.979		
				5.5	2.3452
60	78.741	87.631	93.981	6.0	2.4495
66	.....	112.54	120.70	6.5	2.5495
72	.....	141.42	151.67	7.0	2.6458
78	.....	174.49	187.13	7.5	2.7386
				8.0	2.8284
84	.....	211.96	227.31	8.5	2.9155
90	.....	254.04	272.45	9.0	3.0000
96	.....	300.94	322.74	9.5	3.0821
				10.0	3.1623
102	.....	352.85	378.42		
108	.....	409.97	439.67	11.0	3.3166
114	.....	472.48	506.72	12.0	3.4641
120	.....	540.58	579.76	13.0	3.6056
				14.0	3.7417
				15.0	3.8730

* C_s=0.310 for modern concrete pipe lines made by the dry mixture process.
C_s=0.345 for modern "wet mix" jointed pipe and for well-made monolithic concrete pipe lines or pressure tunnels.
C_s=0.370 for glazed interior pipe lines with joints practically as smooth as interior of pipe.

Table 31.—*Flow of water in second-feet and velocity in feet per second in 10-year-old* **riveted steel pipe** *based on the Hazen-Williams formula, coefficient C=100.*

$$V = C\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$$

Diameter, in inches	s=.0001		s=.0002		s=.0003		s=.0004		s=.0005		s=.0006	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.05	0.25	0.07	0.36	0.09	0.46	0.10	0.51	0.12	0.61	0.13	0.66
8	0.10	0.29	0.15	0.43	0.19	0.54	0.22	0.63	0.25	0.72	0.27	0.77
10	0.19	0.35	0.27	0.49	0.34	0.62	0.39	0.72	0.44	0.81	0.49	0.90
12	0.30	0.38	0.43	0.55	0.54	0.69	0.63	0.80	0.71	0.90	0.79	1.01
14	0.45	0.42	0.65	0.61	0.81	0.76	0.95	0.89	1.07	1.00	1.18	1.10
16	0.64	0.46	0.93	0.67	1.15	0.82	1.35	0.97	1.52	1.09	1.68	1.20
18	0.87	0.49	1.26	0.71	1.57	0.89	1.84	1.04	2.07	1.17	2.29	1.30
20	1.15	0.53	1.67	0.77	2.07	0.95	2.42	1.11	2.73	1.25	3.02	1.38
22	1.47	0.56	2.14	0.81	2.67	1.01	3.11	1.18	3.51	1.33	3.88	1.47
24	1.85	0.59	2.69	0.86	3.35	1.07	3.91	1.24	4.42	1.41	4.87	1.55
26	2.29	0.62	3.32	0.90	4.14	1.12	4.83	1.31	5.45	1.48	6.02	1.63
28	2.78	0.65	4.04	0.94	5.03	1.18	5.87	1.37	6.62	1.55	7.31	1.71
30	3.33	0.68	4.84	0.99	6.03	1.23	7.04	1.43	7.94	1.62	8.76	1.78
32	3.95	0.71	5.74	1.03	7.14	1.28	8.34	1.49	9.41	1.68	10.4	1.86
34	4.63	0.73	6.73	1.07	8.38	1.33	9.78	1.55	11.0	1.74	12.2	1.93
36	5.38	0.76	7.82	1.11	9.73	1.38	11.4	1.61	12.8	1.81	14.2	2.01
38	6.20	0.79	9.01	1.14	11.2	1.42	13.1	1.66	14.8	1.88	16.3	2.07
40	7.10	0.81	10.3	1.18	12.8	1.47	15.0	1.72	16.9	1.94	18.7	2.14
42	8.07	0.84	11.7	1.22	14.6	1.52	17.1	1.78	19.2	2.00	21.2	2.20
44	9.12	0.86	13.3	1.26	16.5	1.56	19.3	1.83	21.7	2.06	24.0	2.27
46	10.2	0.88	14.9	1.29	18.5	1.60	21.7	1.88	24.4	2.11	27.0	2.34
48	11.5	0.91	16.7	1.33	20.7	1.65	24.2	1.93	27.3	2.17	30.2	2.40
50	12.8	0.94	18.6	1.36	23.1	1.69	27.0	1.98	30.4	2.23	33.6	2.46
52	14.1	0.96	20.6	1.40	25.6	1.74	29.9	2.03	33.7	2.29	37.2	2.52
54	15.6	0.98	22.7	1.43	28.3	1.78	33.0	2.08	37.3	2.34	41.1	2.58
56	17.2	1.01	25.0	1.46	31.1	1.82	36.3	2.12	41.0	2.40	45.2	2.64
58	18.9	1.03	27.4	1.49	34.1	1.86	39.9	2.17	45.0	2.45	49.6	2.70
60	20.6	1.05	30.0	1.53	37.3	1.90	43.6	2.22	49.1	2.50	54.2	2.76
66	26.5	1.11	38.5	1.62	47.9	2.02	56.0	2.36	63.2	2.66	69.7	2.93
72	33.3	1.18	48.4	1.71	60.3	2.13	70.4	2.49	79.4	2.81	87.6	3.10
78	41.1	1.24	59.7	1.80	74.4	2.24	86.9	2.62	98.0	2.95	108	3.26
84	49.9	1.30	72.6	1.89	90.4	2.35	106	2.75	119	3.09	131	3.40
90	59.9	1.36	87.0	1.97	108	2.44	127	2.87	143	3.24	158	3.58
96	70.9	1.41	103	2.05	128	2.55	150	2.98	169	3.36	187	3.72
102	83.2	1.47	121	2.13	151	2.66	176	3.10	198	3.49	219	3.86
108	96.7	1.52	141	2.22	175	2.75	204	3.21	231	3.63	254	3.99
114	111	1.57	162	2.29	202	2.85	236	3.33	266	3.75	293	4.13
120	128	1.63	186	2.37	231	2.94	270	3.44	304	3.87	336	4.28

NOTE.—For new cast-iron pipe, straight and smooth, multiply tabular quantities by 1.30; for new riveted steel or 10-year-old cast iron, 1.10; first-class masonry or concrete conduits, 1.80; vitrified pipe, 1.10; brick sewers, 1.00.

Table 31.—*Flow of water in second-feet and velocity in feet per second in 10-year-old* **riveted steel pipe** *based on the Hazen-Williams formula, coefficient C=100*—Continued.

$$V = C\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$$

Diameter in inches	s=.0007		s=.0008		s=.0009		s=.0010		s=.0012		s=.0014	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.14	0.71	0.15	0.76	0.16	0.81	0.17	0.87	0.18	0.92	0.20	1.02
8	0.29	0.84	0.32	0.92	0.34	0.97	0.36	1.03	0.39	1.12	0.43	1.23
10	0.53	0.97	0.57	1.04	0.61	1.12	0.64	1.17	0.71	1.30	0.77	1.41
12	0.86	1.09	0.92	1.17	0.98	1.25	1.04	1.32	1.14	1.45	1.24	1.58
14	1.28	1.20	1.38	1.29	1.47	1.37	1.56	1.46	1.72	1.61	1.87	1.75
16	1.82	1.30	1.96	1.40	2.09	1.50	2.21	1.58	2.44	1.75	2.65	1.90
18	2.48	1.40	2.67	1.51	2.85	1.61	3.01	1.70	3.32	1.88	3.61	2.04
20	3.23	1.50	3.52	1.61	3.75	1.72	3.97	1.82	4.39	2.01	4.77	2.19
22	4.21	1.60	4.53	1.72	4.82	1.83	5.11	1.93	5.63	2.13	6.12	2.32
24	5.29	1.68	5.69	1.81	6.06	1.93	6.42	2.04	7.08	2.25	7.70	2.45
26	6.54	1.77	7.03	1.91	7.49	2.03	7.93	2.15	8.75	2.37	9.50	2.58
28	7.94	1.86	8.54	2.00	9.10	2.13	9.63	2.26	10.6	2.48	11.5	2.69
30	9.52	1.94	10.2	2.08	10.9	2.22	11.5	2.34	12.7	2.59	13.8	2.81
32	11.3	2.02	12.1	2.17	12.9	2.31	13.7	2.45	15.1	2.70	16.4	2.94
34	13.2	2.09	14.2	2.25	15.2	2.41	16.0	2.54	17.7	2.81	19.2	3.05
36	15.4	2.18	16.5	2.33	17.6	2.49	18.6	2.63	20.6	2.91	22.4	3.17
38	17.7	2.25	19.1	2.42	20.3	2.58	21.5	2.73	23.7	3.01	25.8	3.28
40	20.3	2.33	21.8	2.50	23.2	2.66	24.6	2.82	27.1	3.11	29.5	3.38
42	23.1	2.40	24.8	2.58	26.4	2.74	28.0	2.91	30.9	3.21	33.5	3.48
44	26.1	2.47	28.0	2.65	29.9	2.83	31.6	2.99	34.9	3.30	37.9	3.59
46	29.3	2.54	31.5	2.73	33.6	2.91	35.5	3.08	39.2	3.40	42.6	3.69
48	32.8	2.61	35.2	2.80	37.5	2.98	39.7	3.16	43.8	3.49	47.7	3.79
50	36.5	2.68	39.2	2.88	41.8	3.07	44.2	3.24	48.8	3.58	53.1	3.89
52	40.5	2.75	43.5	2.95	46.3	3.14	49.0	3.32	54.1	3.67	58.8	3.99
54	44.7	2.81	48.0	3.02	51.2	3.22	54.2	3.41	59.8	3.76	65.0	4.09
56	49.2	2.88	52.8	3.09	56.3	3.29	59.6	3.48	65.8	3.85	71.5	4.18
58	53.9	2.94	57.9	3.16	61.8	3.37	65.4	3.56	72.1	3.93	78.4	4.27
60	58.9	3.00	63.3	3.22	67.5	3.44	71.5	3.64	78.9	4.02	85.7	4.37
66	75.7	3.19	81.4	3.43	86.7	3.65	91.8	3.86	101	4.25	110	4.63
72	95.2	3.37	102	3.61	109	3.86	115	4.07	127	4.49	138	4.88
78	118	3.56	126	3.80	135	4.07	142	4.28	157	4.73	171	5.15
84	143	3.71	153	3.98	164	4.26	173	4.50	191	4.96	208	5.40
90	171	3.87	184	4.17	196	4.44	208	4.71	229	5.18	249	5.64
96	203	4.04	218	4.34	232	4.62	246	4.89	271	5.39	295	5.87
102	236	4.19	256	4.51	273	4.81	289	5.09	318	5.60	345	6.10
108	277	4.35	297	4.67	317	4.98	335	5.27	370	5.82	402	6.32
114	319	4.50	343	4.84	365	5.15	387	5.46	427	6.02	464	6.55
120	365	4.65	392	4.99	418	5.32	442	5.63	488	6.21	531	6.76

NOTE.—For new cast-iron pipe, straight and smooth, multiply tabular quantities by 1.30; for new riveted steel or 10-year-old cast-iron, 1.10; first-class masonry or concrete conduits, 1.20; vitrified pipe, 1.10; brick sewers, 1.00.

Table 31.—*Flow of water in second-feet and velocity in feet per second in ten-year-old* **riveted steel pipe** *based on the Hasen-Williams formula, coefficient C=100*—Continued.

$$V = C\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$$

Diameter, in inches	s=.0016		s=.0018		s=.0020		s=.0025		s=.0030		s=.0040	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.22	1.12	0.23	1.17	0.24	1.22	0.27	1.38	0.30	1.53	0.35	1.78
8	0.46	1.32	0.49	1.40	0.52	1.49	0.59	1.69	0.65	1.86	0.75	2.15
10	0.83	1.52	0.88	1.61	0.93	1.71	1.05	1.93	1.16	2.13	1.36	2.49
12	1.34	1.71	1.42	1.81	1.51	1.92	1.70	2.16	1.88	2.39	2.19	2.79
14	2.00	1.87	2.14	2.00	2.26	2.11	2.55	2.39	2.82	2.64	3.29	3.08
16	2.85	2.04	3.03	2.17	3.21	2.30	3.62	2.59	4.00	2.86	4.67	3.35
18	3.88	2.20	4.14	2.34	4.38	2.48	4.94	2.80	5.45	3.08	6.37	3.60
20	5.12	2.35	5.46	2.50	5.78	2.65	6.52	2.99	7.19	3.30	8.40	3.85
22	6.58	2.49	7.01	2.66	7.42	2.81	8.38	3.17	9.24	3.50	10.8	4.09
24	8.27	2.63	8.82	2.81	9.33	2.97	10.5	3.34	11.6	3.69	13.6	4.33
26	10.2	2.77	10.9	2.96	11.5	3.12	13.0	3.53	14.3	3.88	16.8	4.56
28	12.4	2.90	13.2	3.09	14.0	3.27	15.8	3.69	17.4	4.07	20.4	4.77
30	14.9	3.03	15.9	3.24	16.8	3.42	18.9	3.85	20.9	4.26	24.4	4.97
32	17.6	3.15	18.8	3.37	19.9	3.56	22.4	4.01	24.8	4.44	28.9	5.17
34	20.7	3.28	22.0	3.49	23.3	3.70	26.3	4.17	29.0	4.60	33.9	5.38
36	24.0	3.40	25.6	3.62	27.1	3.83	30.6	4.33	33.7	4.77	39.4	5.58
38	27.7	3.52	29.5	3.75	31.3	3.97	35.3	4.48	38.9	4.94	45.4	5.76
40	31.7	3.63	33.8	3.87	35.8	4.10	40.4	4.63	44.5	5.10	52.0	5.96
42	36.1	3.75	38.4	3.99	40.7	4.23	45.9	4.77	50.6	5.26	59.1	6.14
44	40.7	3.85	43.4	4.11	46.0	4.36	51.8	4.91	57.2	5.42	66.8	6.33
46	45.8	3.97	48.8	4.23	51.7	4.48	58.3	5.05	64.3	5.57	75.1	6.51
48	51.2	4.07	54.6	4.34	57.8	4.60	65.2	5.19	71.9	5.72	84.0	6.68
50	57.0	4.18	60.8	4.46	64.3	4.72	72.6	5.32	80.1	5.87	93.5	6.86
52	63.2	4.29	67.4	4.57	71.3	4.84	80.4	5.45	88.8	6.02	104	7.05
54	69.8	4.39	74.4	4.68	78.8	4.95	88.8	5.58	98.0	6.16	115	7.23
56	76.8	4.49	81.9	4.79	86.7	5.07	97.8	5.72	108	6.31	126	7.37
58	84.3	4.59	89.8	4.89	95.0	5.18	107	5.83	118	6.43	138	7.52
60	92.1	4.69	98.2	5.00	104	5.30	117	5.96	129	6.57	151	7.69
66	118	4.97	126	5.30	134	5.64	151	6.35	166	6.99	194	8.17
72	149	5.27	159	5.62	168	5.94	189	6.69	209	7.39	244	8.63
78	184	5.54	196	5.91	207	6.24	234	7.05	258	7.77	301	9.07
84	223	5.80	238	6.18	252	6.55	284	7.38	313	8.13	366	9.51
90	268	6.07	285	6.45	302	6.83	340	7.70	376	8.51	439	9.94
96	317	6.31	338	6.72	358	7.12	403	8.02	445	8.85	520	10.3
102	372	6.56	396	6.98	419	7.38	473	8.34	522	9.20	610	10.7
108	432	6.79	461	7.25	488	7.67	550	8.64	607	9.54	709	11.1
114	498	7.03	531	7.49	562	7.93	634	8.94	700	9.88	817	11.5
120	570	7.26	608	7.74	643	8.19	726	9.24	801	10.2	935	11.9

NOTE.—For new cast-iron pipe, straight and smooth, multiply tabular quantities by 1.30; for new riveted steel or 10-year-old cast iron, 1.10; first-class masonry or concrete conduits, 1.20; vitrified pipe, 1.10; brick sewers, 1.00.

Table 31.—*Flow of water in second-feet and velocity in feet per second in 10-year-old* **riveted steel pipe,** *based on the Hasen-Williams formula, coefficient C=100*—Continued.

$$V = C\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$$

Diameter, in inches	s=.005		s=.006		s=.007		s=.008		s=.009		s=.010	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.40	2.04	0.44	2.24	0.49	2.44	0.51	2.60	0.55	2.80	0.58	2.95
8	0.85	2.44	0.94	2.69	1.02	2.92	1.10	3.15	1.17	3.35	1.24	3.55
10	1.53	2.81	1.69	3.10	1.84	3.37	1.97	3.61	2.10	3.85	2.23	4.09
12	2.47	3.15	2.73	3.48	2.97	3.78	3.19	4.06	3.40	4.33	3.60	4.58
14	3.71	3.47	4.09	3.83	4.45	4.16	4.78	4.47	5.10	4.77	5.39	5.04
16	5.27	3.77	5.81	4.16	6.32	4.53	6.79	4.86	7.23	5.18	7.66	5.49
18	7.18	4.06	7.93	4.49	8.62	4.88	9.26	5.24	9.87	5.58	10.4	5.89
20	9.48	4.34	10.5	4.81	11.4	5.23	12.2	5.59	13.0	5.96	13.8	6.33
22	12.2	4.62	13.4	5.08	14.6	5.53	15.7	5.95	16.7	6.33	17.7	6.71
24	15.3	4.87	16.9	5.38	18.4	5.86	19.7	6.27	21.0	6.69	22.3	7.10
26	18.9	5.13	20.9	5.67	22.7	6.16	24.4	6.62	26.0	7.06	27.5	7.46
28	23.0	5.38	25.3	5.92	27.5	6.43	29.6	6.92	31.5	7.37	33.4	7.81
30	27.5	5.60	30.4	6.19	33.0	6.72	35.5	7.23	37.8	7.70	40.0	8.15
32	32.6	5.84	36.0	6.45	39.1	7.00	42.0	7.52	44.8	8.02	47.4	8.49
34	38.3	6.07	42.2	6.69	45.9	7.28	49.3	7.82	52.6	8.34	55.6	8.82
36	44.5	6.30	49.1	6.95	53.3	7.54	57.3	8.11	61.1	8.64	64.7	9.15
38	51.3	6.51	56.6	7.19	61.5	7.81	66.1	8.39	70.4	8.94	74.5	9.46
40	58.7	6.73	64.7	7.41	70.4	8.07	75.6	8.66	80.6	9.24	85.3	9.77
42	66.7	6.93	73.6	7.65	80.0	8.32	86.0	8.94	91.6	9.52	97.0	10.1
44	75.4	7.14	83.2	7.88	90.4	8.56	97.2	9.20	104	9.85	110	10.4
46	84.7	7.34	93.5	8.10	102	8.84	109	9.45	116	10.1	123	10.7
48	94.8	7.54	105	8.36	114	9.07	123	9.71	130	10.3	138	11.0
50	106	7.77	116	8.51	127	9.31	136	9.97	145	10.6	153	11.2
52	117	7.93	129	8.75	140	9.49	151	10.2	161	10.9	170	11.5
54	129	8.11	143	8.99	155	9.75	166	10.4	177	11.1	188	11.8
56	142	8.30	157	9.18	170	9.94	183	10.7	195	11.4	207	12.1
58	156	8.50	172	9.37	187	10.2	201	11.0	214	11.7	227	12.4
60	170	8.66	188	9.58	204	10.4	220	11.2	234	11.9	248	12.6
66	219	9.22	242	10.2	263	11.1	282	11.9	301	12.7	318	13.4
72	275	9.73	304	10.7	330	11.7	355	12.6	378	13.4	400	14.2
78	340	10.2	375	11.3	407	12.3	438	13.2	467	14.1	494	14.9
84	413	10.7	456	11.8	495	12.9	532	13.8	567	14.7	600	15.6
90	495	11.2	546	12.4	594	13.4	638	14.4	680	15.4	720	16.3
96	587	11.7	647	12.9	704	14.0	756	15.0	806	16.0	853	17.0
102	688	12.1	759	13.4	825	14.5	887	15.6	945	16.7	1000	17.6
108	800	12.6	882	13.9	959	15.1	1031	16.2	1098	17.3	1163	18.3
114	922	13.0	1017	14.3	1105	15.6	1188	16.8	1266	17.9	1340	18.9
120	1055	13.4	1164	14.8	1265	16.1	1360	17.3	1449	18.4	1534	19.5

NOTE.—For new cast-iron pipe, straight and smooth, multiply tabular quantities by 1.30; for new riveted steel or 10-year old cast-iron, 1.10; first-class masonry or concrete conduits, 1.20; vitrified pipe, 1.10; brick sewers, 1.00.

Values below horizontal lines should be used with caution, as experimental data are almost entirely lacking for high velocities in pipes of this size.

Table 31.—*Flow of water in second-feet and velocity in feet per second in 10-year-old* **riveted steel pipe,** *based on the Hazen-Williams formula, coefficient C=100*—Continued.

$$V = C\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$$

Diameter, in inches	s=.0125		s=.015		s=.0175		s=.020		s=.025		s=.030	
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V
6	0.66	3.36	0.72	3.67	0.79	4.02	0.84	4.28	0.95	4.84	1.05	5.35
8	1.40	4.01	1.54	4.41	1.67	4.79	1.80	5.16	2.03	5.82	2.24	6.42
10	2.51	4.60	2.77	5.08	3.01	5.52	3.24	5.94	3.65	6.69	4.03	7.39
12	4.06	5.17	4.48	5.70	4.86	6.19	5.23	6.66	5.90	7.51	6.51	8.29
14	6.06	5.69	6.71	6.28	7.30	6.83	7.84	7.33	8.85	8.28	9.76	9.13
16	8.64	6.19	9.53	6.83	10.4	7.45	11.1	7.95	12.6	9.03	13.9	9.96
18	11.8	6.68	13.0	7.36	14.1	7.98	15.2	8.60	17.1	9.68	18.9	10.7
20	15.5	7.11	17.2	7.88	18.6	8.53	20.0	9.17	22.6	10.4	24.9	11.4
22	20.0	7.58	22.0	8.33	24.0	9.09	25.7	9.74	29.0	11.0	32.0	12.1
24	25.1	7.99	27.7	8.82	30.1	9.58	32.4	10.3	36.5	11.6	40.3	12.8
26	31.0	8.41	34.2	9.28	37.2	10.1	40.0	10.8	45.1	12.2	49.7	13.5
28	37.7	8.82	41.6	9.73	45.2	10.6	48.5	11.3	54.8	12.8	60.4	14.1
30	45.2	9.21	49.8	10.1	54.2	11.0	58.2	11.9	65.7	13.4	72.4	14.7
32	53.5	9.58	59.0	10.6	64.2	11.5	69.0	12.4	77.8	13.9	85.8	15.4
34	62.8	9.96	69.3	11.0	75.3	11.9	80.9	12.8	91.2	14.5	101	16.0
36	72.9	10.3	80.5	11.4	87.5	12.4	94.0	13.3	106	15.0	117	16.6
38	84.1	10.7	92.8	11.8	101	12.8	108	13.7	122	15.5	135	17.1
40	96.2	11.0	106	12.2	115	13.2	124	14.2	140	16.0	154	17.7
42	109	11.3	121	12.6	131	13.6	141	14.7	159	16.5	176	18.3
44	124	11.7	136	12.9	148	14.0	159	15.1	180	17.0	198	18.8
46	139	12.0	153	13.3	167	14.5	179	15.5	202	17.5	223	19.3
48	155	12.3	172	13.7	186	14.8	200	15.9	226	18.0	249	19.8
50	173	12.7	191	14.0	208	15.2	223	16.4	252	18.5	278	20.4
52	192	13.0	212	14.4	230	15.6	247	16.8	279	18.9	.....	.....
54	212	13.3	234	14.7	254	16.0	273	17.2	308	19.4	.....	.....
56	233	13.6	257	15.0	280	16.4	300	17.5	339	19.8	.....	.....
58	256	13.9	282	15.4	307	16.7	330	18.0	372	20.3	.....	.....
60	280	14.3	308	15.7	335	17.1	360	18.3	406	20.7	.....	.....
66	359	15.1	396	16.7	431	18.1	463	19.5	.....	.....	.....	.....
72	451	16.0	498	17.6	541	19.1	582	20.6	.....	.....	.....	.....
78	557	16.8	615	18.5	668	20.1	.....	.....	.....	.....	.....	.....
84	677	17.6	747	19.4	.....	.....	.....	.....	.....	.....	.....	.....
90	812	18.4	896	20.3	.....	.....	.....	.....	.....	.....	.....	.....
96	962	19.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
102	1128	19.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
108	1311	20.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—For new cast-iron pipe, straight and smooth, multiply tabular quantities by 1.30; for new riveted steel or 10-year-old cast iron, 1.10; first-class masonry or concrete conduits, 1.20; vitrified pipe, 1.10; brick sewers, 1.00.

Values below horizontal lines should be used with caution, as experimental data are almost entirely lacking for high velocities in pipes of this size.

Table 32.—*Weight of cast-iron pipe in pounds per running foot.*

[The weight of cast iron is assumed to be 450 pounds per cubic foot, or 0.2604 pound per cubic inch. For spigot and faucet joints add to the weight of each section of pipe of any size the weight of 8 inches in length of the plain pipe as given in the table. For lead pipe multiply by 1.6; copper, multiply by 1.2; brass, add one-seventh; wrought iron, add one-fifteenth.]

Inner diameter of bore in inches	Thickness of iron in inches									
	⅝	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½
1	5.07	7.38	9.99	12.9	16.2	19.7	23.5	27.7	32.1	36.9
1¼	6.00	8.61	11.5	14.8	18.3	22.2	26.3	30.8	35.5	40.6
1½	6.92	9.84	13.1	16.6	20.5	24.6	29.1	33.8	38.9	44.3
1¾	7.84	11.1	14.6	18.5	22.6	27.1	31.8	36.9	42.3	48.0
2	8.76	12.3	16.2	20.3	24.8	29.5	34.6	40.0	45.7	51.7
2¼	9.69	13.5	17.7	22.2	26.9	32.0	37.4	43.1	49.0	55.4
2½	10.6	14.8	19.2	24.0	29.1	34.5	40.1	46.1	52.4	59.1
2¾	11.5	16.0	20.8	25.9	31.2	36.9	42.9	49.2	55.8	62.7
3	12.5	17.2	22.3	27.7	33.4	39.4	45.7	52.3	59.2	66.4
3½	14.3	19.7	25.4	31.4	37.7	44.3	51.2	58.4	65.9	73.8
4	16.1	22.2	28.5	35.1	42.0	49.2	56.7	64.6	72.7	81.2
4½	18.0	24.6	31.5	38.8	46.3	54.1	62.3	70.7	79.5	88.6
5	19.8	27.1	34.6	42.5	50.6	59.1	67.8	76.9	87.2	96.0
5½	21.7	29.5	37.7	46.1	54.9	64.0	73.3	83.0	94.0	103
6	25.4	32.0	40.8	49.8	59.2	68.9	78.9	89.2	99.8	111
7	27.2	36.9	46.9	57.2	67.8	78.7	89.4	102	113	126
8	30.9	41.8	53.1	64.6	76.4	88.6	101	114	127	140
9	34.6	46.8	59.2	72.0	85.1	98.4	112	126	140	155
10	38.3	51.7	65.3	79.4	93.6	108	123	138	154	170
11	42.0	56.6	71.5	86.7	102	118	134	151	168	185
12	45.7	61.5	77.7	94.1	111	128	145	163	181	199
13	49.4	66.4	83.8	102	120	138	156	175	195	214
14	53.1	71.4	89.4	109	128	148	168	188	208	229
15	56.7	76.3	96.1	116	137	158	179	200	222	244
16	60.4	81.2	102	124	145	167	190	212	235	258
17	64.1	86.1	108	131	154	177	201	225	249	273
18	67.8	91.0	115	139	163	187	212	237	262	288
19	71.5	96.0	121	146	171	197	223	249	276	303
20	75.2	101	127	153	180	207	234	261	289	317
21	78.9	106	133	161	188	217	245	274	303	332
22	82.6	111	139	168	196	227	256	286	316	347
23	86.3	116	145	175	206	236	267	298	330	362
24	89.9	121	152	183	214	246	278	311	343	375
25	93.6	126	158	190	223	256	289	323	357	391
26	97.3	131	164	198	231	266	300	335	370	406
27	101	135	170	205	240	276	311	348	384	421
28	105	140	176	212	249	286	323	360	397	436
29	109	145	182	220	257	295	334	372	411	450
30	112	150	188	227	266	305	345	384	424	465
31	116	155	195	234	275	315	356	397	438	480
32	120	160	201	242	283	325	367	409	451	495
33	123	165	207	249	292	335	378	421	465	509
34	127	170	213	257	300	345	389	434	479	524
35	131	175	219	264	309	354	400	446	492	539
36	134	180	225	271	318	364	411	458	506	554
42	156	210	262	315	370	423	478	532	588	644
48	178	239	298	359	422	482	544	605	669	733
54	199	267	335	403	472	541	610	679	750	817
60	222	297	372	447	522	599	675	752	828	906

Table 33.—*Theoretical velocity of water in feet per second for various heads.*

$$V=\sqrt{2gh}. \quad g=32.16.$$

Head, in feet	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.00	.....	0.254	0.358	0.439	0.507	0.567	0.621	0.671	0.717	0.761
.01	0.802	0.841	0.878	0.914	0.949	0.982	1.014	1.046	1.076	1.105
.02	1.134	1.162	1.190	1.216	1.242	1.268	1.293	1.318	1.342	1.366
.03	1.388	1.412	1.435	1.457	1.479	1.500	1.522	1.543	1.563	1.584
.04	1.604	1.624	1.644	1.663	1.682	1.701	1.720	1.739	1.757	1.775
.05	1.793	1.811	1.829	1.846	1.864	1.881	1.898	1.915	1.931	1.948
.06	1.964	1.981	1.997	2.013	2.028	2.045	2.070	2.076	2.091	2.107
.07	2.122	2.137	2.152	2.167	2.182	2.196	2.211	2.225	2.240	2.254
.08	2.268	2.283	2.297	2.310	2.324	2.338	2.352	2.366	2.379	2.393
.09	2.406	2.419	2.433	2.446	2.459	2.472	2.485	2.498	2.511	2.523
.10	2.536	2.549	2.561	2.574	2.586	2.599	2.611	2.623	2.636	2.648
.11	2.660	2.672	2.684	2.696	2.708	2.720	2.732	2.743	2.755	2.767
.12	2.778	2.790	2.801	2.813	2.824	2.835	2.847	2.858	2.869	2.880
.13	2.892	2.903	2.914	2.925	2.936	2.947	2.958	2.968	2.979	2.990
.14	3.001	3.011	3.022	3.033	3.043	3.054	3.064	3.075	3.085	3.096
.15	3.106	3.116	3.127	3.137	3.147	3.157	3.168	3.178	3.188	3.198
.16	3.208	3.218	3.228	3.238	3.248	3.258	3.267	3.277	3.287	3.297
.17	3.307	3.316	3.326	3.336	3.345	3.355	3.365	3.374	3.384	3.393
.18	3.402	3.412	3.421	3.431	3.440	3.450	3.459	3.468	3.477	3.486
.19	3.496	3.505	3.514	3.523	3.532	3.541	3.551	3.560	3.569	3.578

Head, in feet	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.2	3.586	3.675	3.762	3.846	3.929	4.010	4.089	4.167	4.244	4.319
0.3	4.393	4.465	4.536	4.628	4.676	4.745	4.812	4.878	4.944	5.008
0.4	5.072	5.135	5.197	5.259	5.320	5.380	5.439	5.498	5.556	5.614
0.5	5.671	5.727	5.783	5.838	5.893	5.947	6.001	6.054	6.107	6.160
0.6	6.212	6.263	6.315	6.365	6.416	6.465	6.525	6.564	6.613	6.662
0.7	6.710	6.757	6.805	6.852	6.899	6.946	6.992	7.038	7.083	7.128
0.8	7.173	7.218	7.262	7.306	7.350	7.394	7.438	7.481	7.523	7.566
0.9	7.608	7.650	7.692	7.734	7.776	7.817	7.858	7.898	7.939	7.979
1.0	8.020	8.060	8.099	8.139	8.179	8.218	8.257	8.296	8.335	8.373
1.1	8.412	8.450	8.487	8.525	8.563	8.600	8.638	8.675	8.712	8.749
1.2	8.785	8.822	8.858	8.894	8.930	8.967	9.002	9.038	9.073	9.108
1.3	9.144	9.179	9.214	9.249	9.284	9.318	9.353	9.387	9.421	9.455
1.4	9.489	9.523	9.557	9.590	9.624	9.657	9.690	9.724	9.757	9.790
1.5	9.822	9.855	9.888	9.920	9.953	9.985	10.017	10.049	10.081	10.113
1.6	10.145	10.176	10.208	10.239	10.271	10.302	10.333	10.364	10.395	10.425
1.7	10.457	10.487	10.518	10.549	10.579	10.611	10.640	10.670	10.712	10.730
1.8	10.760	10.790	10.820	10.849	10.879	10.908	10.938	10.967	10.996	11.026
1.9	11.055	11.084	11.113	11.142	11.171	11.199	11.228	11.257	11.285	11.314
2.0	11.342	11.370	11.399	11.427	11.455	11.483	11.511	11.539	11.567	11.594
2.1	11.622	11.650	11.677	11.705	11.732	11.760	11.787	11.814	11.841	11.868
2.2	11.896	11.923	11.949	11.976	12.003	12.030	12.057	12.083	12.110	12.137
2.3	12.163	12.189	12.216	12.242	12.268	12.294	12.321	12.347	12.373	12.399
2.4	12.424	12.450	12.476	12.502	12.528	12.553	12.579	12.604	12.630	12.655
2.5	12.681	12.706	12.731	12.757	12.782	12.807	12.832	12.857	12.882	12.907

Table 33.—*Theoretical velocity of water in feet per second for various heads*—Continued.

$V=\sqrt{2gh}$. $g=32.16$.

Head in feet	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.0	2.5	3.6	4.4	5.1	5.7	6.2	6.7	7.2	7.6
1	8.0	8.4	8.8	9.1	9.5	9.8	10.1	10.5	10.8	11.1
2	11.3	11.6	11.9	12.2	12.4	12.7	12.9	13.2	13.4	13.7
3	13.9	14.1	14.3	14.6	14.8	15.0	15.2	15.4	15.6	15.8
4	16.0	16.2	16.4	16.6	16.8	17.0	17.2	17.4	17.6	17.8
5	17.9	18.1	18.3	18.5	18.6	18.8	19.0	19.2	19.3	19.5
6	19.6	19.8	20.0	20.1	20.3	20.5	20.6	20.8	20.9	21.1
7	21.2	21.4	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.5
8	22.7	22.8	23.0	23.1	23.3	23.4	23.5	23.7	23.8	23.9
9	24.1	24.2	24.3	24.5	24.6	24.7	24.8	25.0	25.1	25.2
10	25.4	25.5	25.6	25.7	25.9	26.0	26.1	26.2	26.4	26.5
11	26.6	26.7	26.8	27.0	27.1	27.2	27.3	27.4	27.5	27.7
12	27.8	27.9	28.0	28.1	28.2	28.4	28.5	28.6	28.7	28.8
13	28.9	29.0	29.1	29.2	29.4	29.5	29.6	29.7	29.8	29.9
14	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.9	31.0
15	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0
16	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	33.0
17	33.1	33.2	33.3	33.4	33.5	33.5	33.6	33.7	33.8	33.9
18	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9
19	35.0	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8
20	35.9	36.0	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7
21	36.8	36.8	36.9	37.0	37.1	37.2	37.3	37.4	37.4	37.5
22	37.6	37.7	37.8	37.9	38.0	38.0	38.1	38.2	38.3	38.4
23	38.5	38.5	38.6	38.7	38.8	38.9	39.0	39.0	39.1	39.2
24	39.3	39.4	39.5	39.5	39.6	39.7	39.8	39.9	39.9	40.0
25	40.1	40.2	40.3	40.3	40.4	40.5	40.6	40.7	40.7	40.8
26	40.9	41.0	41.1	41.1	41.2	41.3	41.4	41.4	41.5	41.6
27	41.7	41.8	41.8	41.9	42.0	42.1	42.1	42.2	42.3	42.4
28	42.4	42.5	42.6	42.7	42.7	42.8	42.9	43.0	43.1	43.2
29	43.2	43.3	43.3	43.4	43.5	43.6	43.6	43.7	43.8	43.9
30	43.9	44.0	44.1	44.2	44.2	44.3	44.4	44.4	44.5	44.6
31	44.7	44.7	44.8	44.9	44.9	45.0	45.1	45.2	45.2	45.3
32	45.4	45.4	45.5	45.6	45.6	45.7	45.8	45.9	45.9	46.0
33	46.1	46.1	46.2	46.3	46.3	46.4	46.5	46.6	46.6	46.7
34	46.8	46.8	46.9	47.0	47.0	47.1	47.2	47.2	47.3	47.4
35	47.4	47.5	47.6	47.6	47.7	47.8	47.9	47.9	48.0	48.1
36	48.1	48.2	48.3	48.3	48.4	48.5	48.5	48.6	48.6	48.7
37	48.8	48.8	48.9	49.0	49.1	49.1	49.2	49.2	49.3	49.4
38	49.4	49.5	49.6	49.6	49.7	49.8	49.8	49.9	50.0	50.0
39	50.1	50.1	50.2	50.3	50.3	50.4	50.5	50.5	50.6	50.7
40	50.7	50.8	50.8	50.9	51.0	51.0	51.1	51.2	51.2	51.3
41	51.4	51.4	51.5	51.5	51.6	51.7	51.7	51.8	51.9	51.9
42	52.0	52.0	52.1	52.2	52.2	52.3	52.3	52.4	52.5	52.5
43	52.6	52.7	52.7	52.8	52.8	52.9	53.0	53.0	53.1	53.1
44	53.2	53.3	53.3	53.4	53.4	53.5	53.6	53.6	53.7	53.7
45	53.8	53.9	53.9	54.0	54.0	54.1	54.2	54.2	54.3	54.3
46	54.4	54.5	54.5	54.6	54.6	54.7	54.7	54.8	54.9	54.9
47	55.0	55.0	55.1	55.2	55.2	55.3	55.3	55.4	55.5	55.5
48	55.6	55.6	55.7	55.7	55.8	55.9	55.9	56.0	56.0	56.1
49	56.1	56.2	56.3	56.3	56.4	56.4	56.5	56.5	56.6	56.7

Table 34.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 1 to 1.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.0	0.0	0.1	0.3	0.6	0.9	1.3	1.8	2.4	3.0
1	3.7	4.5	5.3	6.3	7.3	8.3	9.5	10.7	12.0	13.4
2	15	16	18	20	21	23	25	27	29	31
3	33	36	38	40	43	45	48	51	54	56
4	59	62	65	68	72	75	78	82	85	89
5	93	96	100	104	108	112	116	120	125	129
6	133	138	142	147	152	156	161	166	171	176
7	181	187	192	197	203	208	214	220	225	231
8	237	243	249	255	261	268	274	280	287	293
9	300	307	313	320	327	334	341	349	356	363
10	370	378	385	393	401	408	416	424	432	440
11	448	456	465	473	481	490	498	507	516	524
12	533	542	551	560	569	578	588	597	607	616
13	626	636	645	655	665	675	685	695	705	716
14	726	736	747	757	768	779	789	800	811	822
15	833	844	856	867	878	890	901	913	925	936
16	948	960	972	984	996	1,008	1,021	1,033	1,045	1,058
17	1,070	1,083	1,096	1,108	1,121	1,134	1,147	1,160	1,173	1,187
18	1,200	1,213	1,227	1,240	1,254	1,268	1,281	1,295	1,309	1,323
19	1,337	1,351	1,365	1,380	1,394	1,408	1,423	1,437	1,452	1,467
20	1,481	1,496	1,511	1,526	1,541	1,556	1,572	1,587	1,602	1,618
21	1,633	1,649	1,665	1,680	1,696	1,712	1,728	1,744	1,760	1,776
22	1,793	1,809	1,825	1,842	1,858	1,875	1,892	1,908	1,925	1,942
23	1,959	1,976	1,993	2,011	2,028	2,045	2,063	2,080	2,098	2,116
24	2,133	2,151	2,169	2,187	2,205	2,223	2,241	2,260	2,278	2,296
25	2,315	2,333	2,352	2,371	2,389	2,408	2,427	2,446	2,465	2,484
26	2,504	2,523	2,542	2,562	2,581	2,601	2,621	2,640	2,660	2,680
27	2,700	2,720	2,740	2,760	2,781	2,801	2,821	2,842	2,862	2,883
28	2,904	2,924	2,945	2,966	2,987	3,008	3,029	3,051	3,072	3,093
29	3,115	3,136	3,158	3,180	3,201	3,223	3,245	3,267	3,289	3,311
30	3,333	3,356	3,378	3,400	3,423	3,445	3,468	3,491	3,513	3,536
31	3,559	3,582	3,605	3,628	3,652	3,675	3,698	3,722	3,745	3,769
32	3,793	3,816	3,840	3,864	3,888	3,912	3,936	3,960	3,985	4,009
33	4,033	4,058	4,082	4,107	4,132	4,156	4,181	4,206	4,231	4,256
34	4,281	4,307	4,332	4,357	4,383	4,408	4,434	4,460	4,485	4,511
35	4,537	4,563	4,589	4,615	4,641	4,668	4,694	4,720	4,747	4,773
36	4,800	4,827	4,853	4,880	4,907	4,934	4,961	4,988	5,016	5,043
37	5,070	5,098	5,125	5,153	5,181	5,208	5,236	5,264	5,292	5,320
38	5,348	5,376	5,405	5,433	5,461	5,490	5,518	5,547	5,576	5,604
39	5,633	5,662	5,691	5,720	5,749	5,779	5,808	5,837	5,867	5,896
40	5,926	5,956	5,985	6,015	6,045	6,075	6,105	6,135	6,165	6,196
41	6,226	6,256	6,287	6,317	6,348	6,379	6,409	6,440	6,471	6,502
42	6,532	6,564	6,596	6,627	6,658	6,690	6,721	6,753	6,785	6,816
43	6,848	6,880	6,912	6,944	6,976	7,008	7,041	7,073	7,105	7,138
44	7,170	7,203	7,236	7,268	7,301	7,334	7,367	7,400	7,433	7,467

Table 34.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 1 to 1—Continued.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
45	7,500	7,533	7,567	7,600	7,634	7,668	7,701	7,735	7,769	7,803
46	7,837	7,871	7,905	7,940	7,974	8,008	8,043	8,077	8,112	8,147
47	8,181	8,216	8,251	8,286	8,321	8,356	8,392	8,427	8,462	8,498
48	8,533	8,569	8,605	8,640	8,676	8,712	8,748	8,784	8,820	8,856
49	8,893	8,929	8,965	9,002	9,038	9,075	9,112	9,148	9,185	9,222
50	9,259	9,296	9,333	9,371	9,408	9,445	9,483	9,520	9,558	9,596
51	9,633	9,671	9,709	9,747	9,785	9,823	9,861	9,900	9,938	9,976
52	10,015	10,053	10,092	10,131	10,169	10,208	10,247	10,286	10,325	10,364
53	10,404	10,443	10,482	10,522	10,561	10,601	10,641	10,680	10,720	10,760
54	10,800	10,840	10,880	10,920	10,961	11,001	11,041	11,082	11,122	11,163
55	11,204	11,244	11,285	11,326	11,367	11,408	11,449	11,491	11,532	11,573
56	11,615	11,656	11,698	11,740	11,781	11,823	11,865	11,907	11,949	11,991
57	12,033	12,076	12,118	12,160	12,203	12,245	12,288	12,331	12,373	12,416
58	12,459	12,502	12,545	12,588	12,632	12,675	12,718	12,762	12,805	12,849
59	12,893	12,936	12,980	13,024	13,068	13,112	13,156	13,200	13,245	13,289
60	13,333	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 35.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 1½ to 1.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.0	0.0	0.2	0.5	0.9	1.4	2.0	2.7	3.6	4.5
1	5.6	6.7	8.0	9.4	10.9	12.5	14.2	16.1	18.0	20.1
2	22	24	27	29	32	35	38	41	44	47
3	50	53	57	60	64	68	72	76	80	84
4	89	93	98	103	108	112	118	123	128	133
5	139	144	150	156	162	168	174	180	187	193
6	200	207	214	222	228	235	242	249	257	264
7	272	280	288	296	304	312	321	329	338	347
8	356	364	374	383	392	401	411	420	430	440
9	450	460	470	480	491	501	512	522	533	544
10	556	567	577	589	601	612	624	636	648	660
11	672	684	697	709	722	735	748	760	774	787
12	800	813	827	840	854	868	882	896	910	924
13	939	953	968	983	998	1,012	1,028	1,043	1,058	1,073
14	1,089	1,104	1,120	1,136	1,152	1,168	1,184	1,200	1,217	1,233

Table 35.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 1½ to 1—Continued.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
15	1,250	1,267	1,284	1,300	1,318	1,335	1,352	1,369	1,387	1,404
16	1,422	1,440	1,458	1,476	1,494	1,512	1,531	1,549	1,568	1,587
17	1,606	1,624	1,644	1,663	1,682	1,701	1,721	1,740	1,760	1,780
18	1,800	1,820	1,840	1,860	1,881	1,901	1,922	1,943	1,964	1,984
19	2,006	2,027	2,048	2,069	2,091	2,112	2,134	2,156	2,178	2,200
20	2,222	2,244	2,267	2,289	2,311	2,335	2,358	2,380	2,404	2,427
21	2,450	2,473	2,497	2,520	2,544	2,568	2,592	2,616	2,640	2,664
22	2,689	2,713	2,738	2,763	2,788	2,812	2,838	2,863	2,888	2,913
23	2,939	2,964	2,990	3,016	3,042	3,068	3,094	3,120	3,147	3,173
24	3,200	3,227	3,254	3,280	3,308	3,335	3,362	3,389	3,417	3,444
25	3,472	3,500	3,528	3,556	3,584	3,612	3,641	3,669	3,698	3,727
26	3,756	3,784	3,814	3,843	3,872	3,901	3,931	3,960	3,990	4,020
27	4,050	4,080	4,110	4,140	4,171	4,201	4,232	4,263	4,294	4,324
28	4,356	4,387	4,418	4,449	4,481	4,512	4,544	4,576	4,608	4,640
29	4,672	4,704	4,737	4,769	4,802	4,835	4,868	4,900	4,934	4,967
30	5,000	5,033	5,067	5,100	5,134	5,168	5,202	5,236	5,270	5,304
31	5,339	5,373	5,408	5,443	5,478	5,512	5,548	5,583	5,618	5,653
32	5,689	5,724	5,760	5,796	5,832	5,868	5,904	5,940	5,977	6,013
33	6,050	6,087	6,124	6,160	6,198	6,235	6,272	6,309	6,347	6,384
34	6,422	6,460	6,498	6,536	6,574	6,612	6,651	6,689	6,728	6,767
35	6,806	6,844	6,884	6,923	6,962	7,001	7,041	7,080	7,120	7,160
36	7,200	7,240	7,280	7,320	7,361	7,401	7,442	7,483	7,524	7,564
37	7,606	7,647	7,688	7,729	7,771	7,812	7,854	7,896	7,938	7,980
38	8,022	8,064	8,107	8,149	8,192	8,235	8,278	8,320	8,364	8,407
39	8,450	8,493	8,537	8,580	8,624	8,668	8,712	8,756	8,800	8,844
40	8,889	8,933	8,978	9,023	9,068	9,112	9,158	9,203	9,248	9,293
41	9,339	9 384	9.430	9,476	9,522	9,568	9,614	9,660	9,707	9,753
42	9,800	9 847	9.894	9,940	9,988	10,035	10,082	10,129	10,177	10,224
43	10,272	10 320	10.368	10.416	10,464	10,512	10,561	10,609	10,658	10,707
44	10,756	10,804	10,854	10,903	10,952	11,001	11,051	11,100	11,150	11,200
45	11,250	11,300	11,350	11,400	11,451	11,501	11,552	11,603	11,654	11,704
46	11,756	11,807	11,858	11.909	11.961	12,012	12,064	12,116	12,168	12,220
47	12,272	12,324	12,377	12,429	12,482	12,535	12,588	12,640	12,694	12,747
48	12,800	12,853	12,907	12,960	13,014	13,068	13,122	13,176	13,230	13,284
49	13,339	13,393	13,448	13,503	13,558	13,612	13,668	13,723	13,778	13,833
50	13,889	13,944	14.000	14,056	14,112	14,168	14,224	14,280	14,337	14,392
51	14,450	14.507	14.564	14,620	14,678	14,735	14,792	14,849	14,987	14,964
52	15,022	15,080	15 138	15.196	15,254	15,312	15,371	15,430	15,489	15,548
53	15,606	15,664	15.724	15,783	15,842	15,901	15,961	16,020	16,080	16,140
54	16,200	16,260	16,320	16,380	16,441	16,501	16,562	16,623	16,684	16,744
55	16,806	16,867	16,928	16,989	17,051	17,112	17,174	17,236	17,298	17,360
56	17,422	17,484	17,547	17,609	17,672	17,735	17,798	17,860	17,924	17,987
57	18,050	18,113	18,177	18,240	18,304	18,368	18,432	18,496	18,560	18,624
58	18,689	18,753	18,818	18,883	18,948	19,012	19,078	19,143	19,208	19,273
59	19,339	19,404	19,470	19,536	19,602	19,668	19,734	19,800	19,867	19,933
60	20,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 36.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 2 to 1.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.0	0.1	0.3	0.7	1.2	1.9	2.7	3.6	4.7	6.0
1	7.4	9.0	10.7	12.5	14.5	16.7	19.0	21.4	24.0	26.7
2	30	33	36	39	43	46	50	54	58	62
3	67	71	76	81	86	91	96	101	107	113
4	119	125	131	137	143	150	157	164	171	178
5	185	193	200	208	216	224	232	241	249	258
6	267	276	285	294	303	313	323	333	343	353
7	363	373	384	395	406	417	428	439	451	462
8	474	486	498	510	523	535	548	561	574	587
9	600	613	627	641	655	669	683	697	711	726
10	741	756	771	786	801	817	832	848	864	880
11	896	913	929	946	963	980	997	1,014	1,031	1,049
12	1,067	1,084	1,103	1,121	1,139	1,157	1,176	1,195	1,214	1,233
13	1,252	1,271	1,291	1,310	1,330	1,350	1,370	1,390	1,411	1,431
14	1,452	1,473	1,494	1,515	1,536	1,557	1,579	1,601	1,623	1,645
15	1,667	1,689	1,711	1,734	1,757	1,780	1,803	1,826	1,849	1,873
16	1,896	1,920	1,944	1,968	1,992	2,017	2,041	2,066	2,091	2,116
17	2,141	2,166	2,191	2,217	2,243	2,269	2,295	2,321	2,347	2,373
18	2,400	2,427	2,454	2,481	2,508	2,535	2,563	2,590	2,618	2,646
19	2,674	2,702	2,731	2,759	2,788	2,817	2,846	2,875	2,904	2,933
20	2,963	2,993	3,023	3,053	3,083	3,113	3,143	3,174	3,205	3,236
21	3,267	3,298	3,329	3,361	3,392	3,424	3,456	3,488	3,520	3,553
22	3,585	3,618	3,651	3,684	3,717	3,750	3,783	3,817	3,851	3,885
23	3,919	3,953	3,987	4,021	4,056	4,091	4,126	4,161	4,196	4,231
24	4,267	4,302	4,338	4,374	4,410	4,446	4,483	4,519	4,556	4,593
25	4,630	4,667	4,704	4,741	4,779	4,817	4,855	4,893	4,931	4,969
26	5,007	5,046	5,085	5,124	5,163	5,202	5,241	5,281	5,320	5,360
27	5,400	5,440	5,480	5,521	5,561	5,602	5,643	5,684	5,725	5,766
28	5,807	5,849	5,891	5,933	5,975	6,017	6,059	6,101	6,144	6,187
29	6,230	6,273	6,316	6,359	6,403	6,446	6,490	6,534	6,578	6,622
30	6,667	6,711	6,756	6,801	6,846	6,891	6,936	6,981	7,027	7,073
31	7,119	7,165	7,211	7,257	7,303	7,350	7,397	7,444	7,491	7,538
32	7,585	7,633	7,680	7,728	7,776	7,824	7,872	7,921	7,969	8,018
33	8,067	8,116	8,165	8,214	8,263	8,313	8,363	8,413	8,463	8,513
34	8,563	8,613	8,664	8,715	8,766	8,817	8,868	8,919	8,971	9,022
35	9,074	9,126	9,178	9,230	9,283	9,335	9,388	9,441	9,494	9,547
36	9,600	9,653	9,707	9,761	9,815	9,869	9,923	9,977	10,031	10,086
37	10,141	10,196	10,251	10,306	10,361	10,417	10,472	10,528	10,584	10,640
38	10,696	10,753	10,809	10,866	10,923	10,980	11,037	11,094	11,151	11,209
39	11,267	11,325	11,383	11,441	11,499	11,557	11,616	11,675	11,734	11,793
40	11,852	11,911	11,971	12,030	12,090	12,150	12,210	12,270	12,331	12,391
41	12,452	12,513	12,574	12,635	12,696	12,757	12,819	12,881	12,943	13,005
42	13,067	13,129	13,191	13,254	13,317	13,380	13,443	13,506	13,569	13,633
43	13,696	13,760	13,824	13,888	13,952	14,017	14,081	14,146	14,211	14,276
44	14,341	14,406	14,471	14,537	14,603	14,669	14,735	14,801	14,867	14,933

Table 3

second in
Williams

Diameter, in inches	s=.0	
	Q	
6	0.22	
8	0.46	
10	0.83	
12	1.31	
14	2.00	
16	2.85	
18	3.88	
20	5.12	
22	6.58	
24	8.27	
26	10.2	
28	12.4	
30	14.9	
32	17.6	
34	20.7	
36	24.0	
38	27.7	
40	31.7	
42	36.1	
44	40.7	
46	45.8	
48	51.2	
50	57.0	
52	63.2	
54	69.8	
56	76.8	
58	84.3	
60	92.1	
66	118	
72	149	
78	184	
84	223	
90	268	
96	317	
102	372	
108	432	
114	498	
120	570	

NOTE.—For new
by 1.30; for new
concrete conduits

Table 37.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 8 to 1—Continued.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
15	2,500	2,533	2,567	2,601	2,635	2,669	2,704	2,739	2,774	2,809
16	2,844	2,880	2,916	2,952	2,988	3,025	3,062	3,099	3,136	3,173
17	3,211	3,249	3,287	3,325	3,364	3,403	3,442	3,481	3,520	3,560
18	3,600	3,640	3,680	3,721	3,762	3,803	3,844	3,885	3,927	3,969
19	4,011	4,053	4,096	4,139	4,182	4,225	4,268	4,312	4,356	4,400
20	4,444	4,489	4,534	4,579	4,624	4,669	4,715	4,761	4,807	4,853
21	4,900	4,947	4,994	5,041	5,088	5,137	5,184	5,232	5,280	5,329
22	5,378	5,427	5,476	5,525	5,575	5,625	5,675	5,725	5,776	5,827
23	5,878	5,929	5,980	6,032	6,084	6,136	6,188	6,240	6,294	6,346
24	6,400	6,453	6,507	6,561	6,615	6,669	6,724	6,779	6,834	6,889
25	6,944	7,000	7,056	7,112	7,168	7,225	7,282	7,339	7.396	7,453
26	7,511	7,569	7,627	7,685	7,744	7,803	7,862	7,921	7 980	8,040
27	8,100	8,160	8,220	8,281	8,342	8,403	8,464	8,525	8 587	8,649
28	8,711	8,773	8,836	8,899	8,962	9,025	9,088	9,152	9,216	9,280
29	9,344	9,409	9,474	9,539	9,604	9,669	9,735	9,801	9,867	9,993
30	10,000	10,067	10,134	10,201	10,268	10,336	10,404	10,472	10,540	10,609
31	10,678	10,747	10,816	10,885	10,955	11,025	11,095	11,165	11,236	11,307
32	11,378	11,449	11,520	11,592	11,664	11,736	11,808	11,881	11,954	12,027
33	12,100	12,173	12,247	12,321	12,395	12,469	12,544	12,619	12,694	12,769
34	12,844	12,920	12,996	13,072	13,148	13,225	13,302	13,379	13,456	13,533
35	13,611	13,689	13,767	13,845	13,924	14,003	14,082	14,161	14,240	14,320
36	14,400	14,480	14,560	14,641	14,722	14,803	14,884	14,965	15,047	15,129
37	15,211	15,293	15,376	15,459	15,542	15,625	15,708	15,792	15,876	15,960
38	16,044	16,129	16,214	16,299	16,384	16,469	16,555	16,641	16,727	16,813
39	16,900	16,987	17,074	17,161	17,248	17,336	17,424	17,512	17,600	17,689
40	17,778	17,867	17,956	18,045	18,135	18,225	18,315	18,405	18,496	18,587
41	18,678	18,769	18,860	18,952	19,044	19,136	19,228	19,321	19.414	19,507
42	19,600	19,693	19,787	19,881	19,975	20,069	20,164	20,259	20,354	20,449
43	20,544	20,640	20,736	20,832	20,928	21,025	21,122	21,219	21,316	21,413
44	21,511	21,609	21,707	21,805	21,904	22,003	22,102	22,201	22,300	22,400
45	22,500	22,600	22,700	22,801	22,902	23,003	23,104	23,205	23,307	23,409
46	23,511	23,613	23,716	23,819	23,922	24,025	24,128	24,232	24,336	24,440
47	24,544	24,649	24,754	24,859	24,964	25,069	25,175	25,281	25,387	25,493
48	25,600	25,707	25,814	25,921	26,029	26,136	26,244	26,352	26,460	26,569
49	26,678	26,787	26,896	27,005	27,115	27,225	27,335	27,445	27,556	27,667
50	27,778	27,889	28,000	28,112	28,224	28,336	28,448	28,561	28,674	28,787
51	28,900	29,013	29,127	29,241	29,355	29,469	29,584	29,699	29,814	29,929
52	30,044	30,160	30,276	30,392	30,508	30,625	30,742	30,859	30,976	31,093
53	31,211	31,329	31,447	31,565	31,684	31,803	31,922	32,041	32,160	32,280
54	32,400	32,520	32,640	32,761	32,882	33,003	33,124	33,245	33,367	33,489
55	33,611	33,733	33,856	33,979	34,102	34,225	34,348	34,472	34,596	34,720
56	34,844	34,969	35,094	35,219	35,344	35,459	35,595	35,721	35,847	35,973
57	36,100	36,227	36,354	36,481	36,608	36,736	36,864	36,992	37,120	37,249
58	37,378	37,507	37,636	37,765	37,895	38,025	38,155	38,285	38,416	38,547
59	38,678	38,809	38,940	39,072	39,204	39,336	39,468	39,601	39,734	39,867
60	40,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 36.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 2 to 1—Continued.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
45	15,000	15,067	15,134	15,201	15,268	15,335	15,403	15,470	15,538	15,606
46	15,674	15,742	15,811	15,879	15,948	16,017	16,086	16,155	16,224	16,293
47	16,363	16,433	16,503	16,573	16,643	16,713	16,783	16,854	16,925	16,996
48	17,067	17,138	17,209	17,281	17,352	17,424	17,496	17,568	17,640	17,713
49	17,785	17,858	17,931	18,004	18,077	18,150	18,223	18,297	18,371	18,445
50	18,519	18,593	18,667	18,741	18,816	18,891	18,966	19,041	19,116	19,191
51	19,267	19,342	19,418	19,494	19,570	19,646	19,723	19,799	19,876	19,953
52	20,030	20,107	20,184	20,261	20,339	20,417	20,495	20,573	20,651	20,729
53	20,807	20,886	20,965	21,044	21,123	21,202	21,281	21,361	21,440	21,520
54	21,600	21,680	21,760	21,841	21,921	22,002	22,083	22,164	22,245	22,326
55	22,407	22,489	22,571	22,653	22,735	22,817	22,899	22,981	23,064	23,147
56	23,230	23,313	23,396	23,479	23,563	23,646	23,730	23,814	23,898	23,982
57	24,067	24,151	24,236	24,321	24,406	24,491	24,576	24,661	24,747	24,833
58	24,919	25,005	25,091	25,177	25,263	25,350	25,447	25,524	25,611	25,698
59	25,785	25,873	25,960	26,048	26,136	26,224	26,312	26,401	26,489	26,578
60	26,667	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 37.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 3 to 1.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.0	0.1	0.4	1.0	1.8	2.8	4.0	5.4	7.1	9.0
1	11.1	13.4	16.0	18.8	21.8	25.0	28.4	32.2	36.1	40.1
2	44	49	54	59	64	69	75	81	87	93
3	100	106	114	121	128	136	144	152	160	168
4	178	187	196	205	215	225	235	245	256	267
5	278	289	300	312	324	336	348	361	373	387
6	400	413	427	441	455	469	484	499	514	529
7	544	560	576	592	608	625	642	659	676	693
8	711	729	747	765	784	803	822	841	860	880
9	900	920	940	961	982	1,003	1,024	1,045	1,067	1,089
10	1,111	1,133	1,156	1,179	1,202	1,225	1,248	1,272	1,296	1,320
11	1,344	1,369	1,394	1,419	1,444	1,469	1,495	1,521	1,547	1,573
12	1,600	1,627	1,654	1,681	1,708	1,736	1,764	1,792	1,820	1,849
13	1,878	1,907	1,936	1,965	1,995	2,025	2,055	2,085	2,116	2,147
14	2,178	2,209	2,240	2,272	2,304	2,336	2,368	2,401	2,434	2,467

Table 37.—*Amount of material in cubic yards per 100 linear feet of level cut,*

side slopes 8 to 1—Continued.

Depth of center cut in feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
15	2,500	2,533	2,567	2,601	2,635	2,669	2,704	2,739	2,774	2,809
16	2,844	2,880	2,916	2,952	2,988	3,025	3,062	3,099	3,136	3,173
17	3,211	3,249	3,287	3,325	3,364	3,403	3,442	3,481	3,520	3,560
18	3,600	3,640	3,680	3,721	3,762	3,803	3,844	3,885	3,927	3,969
19	4,011	4,053	4,096	4,139	4,182	4,225	4,268	4,312	4,356	4,400
20	4,444	4,489	4,534	4,579	4,624	4,669	4,715	4,761	4,807	4,853
21	4,900	4,947	4,994	5,041	5,088	5,137	5,184	5,232	5,280	5,329
22	5,378	5,427	5,476	5,525	5,575	5,625	5,675	5,725	5,776	5,827
23	5,878	5,929	5,980	6,032	6,084	6,136	6,188	6,240	6,294	6,346
24	6,400	6,453	6,507	6,561	6,615	6,669	6,724	6,779	6,834	6,889
25	6,944	7,000	7,056	7,112	7,168	7,225	7,282	7,339	7.396	7,453
26	7,511	7,569	7,627	7,685	7,744	7,803	7,862	7,921	7 980	8,040
27	8,100	8,160	8,220	8,281	8,342	8,403	8,464	8,525	8 587	8,649
28	8,711	8,773	8,836	8,899	8,962	9,025	9,088	9,152	9,216	9,280
29	9,344	9,409	9,474	9,539	9,604	9,669	9,735	9,801	9,867	9,993
30	10,000	10,067	10,134	10,201	10,268	10,336	10,404	10,472	10,540	10,609
31	10,678	10,747	10,816	10,885	10,955	11,025	11,095	11,165	11,236	11,307
32	11,378	11,449	11,520	11,592	11,664	11,736	11,808	11,881	11,954	12,027
33	12,100	12,173	12,247	12,321	12,395	12,469	12,544	12,619	12,694	12,769
34	12,844	12,920	12,996	13,072	13,148	13,225	13,302	13,379	13,456	13,533
35	13,611	13,689	13,767	13,845	13,924	14,003	14,082	14,161	14,240	14,320
36	14,400	14,480	14,560	14,641	14,722	14,803	14,884	14,965	15,047	15,129
37	15,211	15,293	15,376	15,459	15,542	15,625	15,708	15,792	15,876	15,960
38	16,044	16,129	16,214	16,299	16,384	16,469	16,555	16,641	16,727	16,813
39	16,900	16,987	17,074	17,161	17,248	17,336	17,424	17,512	17,600	17,689
40	17,778	17,867	17,956	18,045	18,135	18,225	18,315	18,405	18,496	18,587
41	18,678	18,769	18,860	18,952	19,044	19,136	19,228	19,321	19.414	19,507
42	19,600	19,693	19,787	19,881	19,975	20,069	20,164	20,259	20,354	20,449
43	20,544	20,640	20,736	20,832	20,928	21,025	21,122	21,219	21,316	21,413
44	21,511	21,609	21,707	21,805	21,904	22,003	22,102	22,201	22,300	22,400
45	22,500	22,600	22,700	22,801	22,902	23,003	23,104	23,205	23,307	23,409
46	23,511	23,613	23,716	23,819	23,922	24,025	24,128	24,232	24,336	24,440
47	24,544	24,649	24,754	24,859	24,964	25,069	25,175	25,281	25,387	25,493
48	25,600	25,707	25,814	25,921	26,029	26,136	26,244	26,352	26,460	26,569
49	26,678	26,787	26,896	27,005	27,115	27,225	27,335	27,445	27,556	27,667
50	27,778	27,889	28,000	28,112	28,224	28,336	28,448	28,561	28,674	28,787
51	28,900	29,013	29,127	29,241	29,355	29,469	29,584	29,699	29,814	29,929
52	30,044	30,160	30,276	30,392	30,508	30,625	30,742	30,859	30,976	31,093
53	31,211	31,329	31,447	31,565	31,684	31,803	31,922	32,041	32,160	32,280
54	32,400	32,520	32,640	32,761	32,882	33,003	33,124	33,245	33,367	33,489
55	33,611	33,733	33,856	33,979	34,102	34,225	34,348	34,472	34,596	34,720
56	34,844	34,969	35,094	35,219	35,344	35,459	35,595	35,721	35,847	35,973
57	36,100	36,227	36,354	36,481	36,608	36,736	36,864	36,992	37,120	37,249
58	37,378	37,507	37,636	37,765	37,895	38,025	38,155	38,285	38,416	38,547
59	38,678	38,809	38,940	39,072	39,204	39,336	39,468	39,601	39,734	39,867
60	40,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 38.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 1 to 1.

Depth of center cut in feet	Surface slope of ground in per cent										
	10	15	20	25	30	35	40	45	50	55	60
1.0	4	4	4	4	4	4	5	5	5	6	6
1.5	8	8	9	9	9	9	10	10	11	12	13
2.0	15	15	16	16	16	17	18	19	20	21	23
2.5	23	24	24	25	25	27	27	29	31	33	36
3.0	33	33	34	35	36	38	39	42	44	47	52
3.5	46	46	47	48	49	51	54	57	60	65	70
4.0	59	60	61	63	65	67	70	74	79	85	92
4.5	76	77	78	80	83	85	89	94	100	107	117
5.0	94	95	97	99	102	106	111	117	124	133	145
5.5	113	114	117	120	123	128	133	141	149	161	175
6.0	134	136	139	142	146	152	158	167	177	191	208
6.5	157	160	163	166	172	178	186	196	208	224	244
7.0	183	185	189	193	199	206	215	227	242	260	283
7.5	210	212	217	222	229	237	248	261	278	299	325
8.0	239	242	247	253	261	270	282	297	316	340	370
8.5	270	274	279	286	295	305	319	336	357	384	418
9.0	303	307	312	320	330	342	357	376	400	430	468
9.5	338	342	348	356	367	381	398	419	446	479	522
10.0	374	378	385	395	406	422	441	464	494	531	578
10.5	412	417	425	436	448	465	486	512	545	585	637
11.0	453	458	467	478	492	510	533	562	598	642	700
11.5	495	501	510	523	538	558	583	615	653	702	765
12.0	539	545	555	569	586	607	634	669	711	764	833
12.5	585	592	603	618	637	659	689	726	772	830	904
13.0	632	640	652	668	689	713	745	785	835	897	978
13.5	681	691	703	720	743	769	803	847	900	967	1,054
14.0	733	743	756	774	799	827	864	911	968	1,040	1,134
14.5	787	797	811	831	857	887	927	977	1,039	1,116	1,216
15.0	841	852	868	888	916	949	994	1,045	1,111	1,194	1,301
15.5	898	910	927	949	978	1,014	1,059	1,116	1,187	1,276	1,390
16.0	957	970	987	1,011	1,042	1,080	1,128	1,189	1,264	1,359	1,480
16.5	1,018	1,031	1,050	1,075	1,108	1,148	1,199	1,265	1,344	1,445	1,573
17.0	1,080	1,095	1,115	1,141	1,176	1,219	1,273	1,343	1,427	1,534	1,669
17.5	1,145	1,160	1,182	1,209	1,246	1,292	1,349	1,423	1,512	1,626	1,770
18.0	1,212	1,227	1,250	1,280	1,319	1,368	1,428	1,506	1,600	1,720	1,874
18.5	1,281	1,297	1,321	1,353	1,394	1,445	1,509	1,591	1,691	1,817	1,980
19.0	1,351	1,368	1,393	1,426	1,470	1,523	1,591	1,678	1,783	1,916	2,088
19.5	1,422	1,440	1,467	1,502	1,548	1,604	1,676	1,767	1,878	2,018	2,199
20.0	1,496	1,515	1,542	1,580	1,628	1,687	1,763	1,859	1,975	2,123	2,313
20.5	1,572	1,592	1,620	1,660	1,710	1,773	1,852	1,953	2,075	2,230	2,430
21.0	1,649	1,670	1,701	1,742	1,795	1,861	1,943	2,049	2,178	2,340	2,550
21.5	1,729	1,751	1,783	1,826	1,882	1,951	2,037	2,148	2,283	2,453	2,673
22.0	1,811	1,834	1,868	1,913	1,971	2,043	2,134	2,250	2,391	2,569	2,800
22.5	1,894	1,918	1,953	2,001	2,061	2,136	2,231	2,353	2,501	2,687	2,928
23.0	1,979	2,004	2,041	2,090	2,153	2,232	2,331	2,458	2,613	2,808	3,058

Table 38.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 1 to 1—Continued.

Depth of center cut in feet	Surface slope of ground in per cent										
	10	15	20	25	30	35	40	45	50	55	60
23.5	2,065	2,091	2,130	2,181	2,247	2,330	2,434	2,566	2,728	2,931	3,194
24.0	2,154	2,181	2,221	2,275	2,344	2,430	2,539	2,677	2,845	3,057	3,331
24.5	2,245	2,274	2,315	2,371	2,443	2,533	2,646	2,790	2,965	3,186	3,472
25.0	2,338	2,368	2,411	2,469	2,545	2,637	2,755	2,905	3,088	3,318	3,615
25.5	2,432	2,463	2,508	2,568	2,647	2,743	2,866	3,022	3,212	3,451	3,761
26.0	2,529	2,561	2,608	2,670	2,752	2,852	2,980	3,142	3,340	3,588	3,910
26.5	2,627	2,661	2,709	2,774	2,859	2,963	3,095	3,264	3,469	3,727	4,062
27.0	2,727	2,762	2,813	2,880	2,968	3,076	3,212	3,388	3,601	3,869	4,217
27.5	2,829	2,865	2,918	2,988	3,079	3,191	3,332	3,515	3,736	4,014	4,374
28.0	2,932	2,970	3,024	3,097	3,191	3,308	3,454	3,643	3,872	4,161	4,534
28.5	3,038	3,077	3,133	3,208	3,306	3,427	3,579	3,775	4,012	4,311	4,698
29.0	3,146	3,187	3,245	3,322	3,423	3,548	3,706	3,909	4,154	4,464	4,864
29.5	3,255	3,297	3,357	3,438	3,542	3,671	3,835	4,045	4,298	4,619	5,033
30.0	3,367	3,409	3,471	3,555	3,663	3,797	3,967	4,183	4,445	4,777	5,205
30.5	3,480	3,524	3,588	3,675	3,786	3,924	4,100	4,323	4,595	4,937	5,380
31.0	3,595	3,641	3,707	3,796	3,911	4,054	4,236	4,466	4,747	5,100	5,558
31.5	3,712	3,759	3,828	3,920	4,039	4,187	4,374	4,612	4,901	5,266	5,739
32.0	3,831	3,880	3,951	4,046	4,169	4,322	4,514	4,760	5,058	5,435	5,923
32.5	3,952	4,002	4,075	4,173	4,300	4,457	4,656	4,909	5,217	5,606	6,109
33.0	4,074	4,126	4,201	4,302	4,433	4,595	4,800	5,061	5,379	5,780	6,298
33.5	4,198	4,252	4,329	4,433	4,568	4,735	4,946	5,215	5,543	5,956	6,491
34.0	4,324	4,379	4,459	4,566	4,705	4,877	5,095	5,372	5,710	6,135	6,686
34.5	4,452	4,509	4,592	4,702	4,845	5,022	5,246	5,531	5,879	6,317	6,884
35.0	4,583	4,641	4,726	4,839	4,987	5,169	5,399	5,693	6,051	6,502	7,085
35.5	4,714	4,774	4,861	4,978	5,130	5,317	5,555	5,856	6,225	6,689	7,288
36.0	4,848	4,910	5,000	5,120	5,276	5,469	5,712	6,023	6,402	6,879	7,496
36.5	4,984	5,048	5,140	5,263	5,423	5,621	5,872	6,191	6,581	7,071	7,705
37.0	5,122	5,187	5,282	5,408	5,573	5,776	6,034	6,362	6,762	7,266	7,918
37.5	5,261	5,328	5,426	5,555	5,725	5,933	6,198	6,535	6,946	7,464	8,132
38.0	5,402	5,471	5,571	5,705	5,879	6,093	6,365	6,711	7,133	7,665	8,353
38.5	5,545	5,615	5,718	5,855	6,033	6,254	6,532	6,888	7,321	7,867	8,572
39.0	5,690	5,763	5,868	6,008	6,191	6,418	6,703	7,069	7,513	8,073	8,797
39.5	5,837	5,912	6,020	6,164	6,351	6,584	6,877	7,252	7,707	8,282	9,024
40.0	5,986	6,062	6,173	6,321	6,513	6,752	7,052	7,436	7,903	8,493	9,254
40.5	6,137	6,215	6,328	6,480	6,677	6,921	7,230	7,623	8,102	8,706	9,487
41.0	6,289	6,369	6,485	6,641	6,843	7,093	7,410	7,813	8,304	8,922	9,722
41.5	6,442	6,524	6,644	6,803	7,011	7,266	7,591	8,004	8,507	9,140	9,961
42.0	6,599	6,683	6,806	6,969	7,181	7,443	7,775	8,198	8,713	9,362	10,203
42.5	6,758	6,844	6,969	7,136	7,353	7,622	7,962	8,395	8,922	9,587	10,447
43.0	6,917	7,006	7,134	7,305	7,527	7,802	8,150	8,593	9,133	9,814	10,694
43.5	7,079	7,170	7,300	7,476	7,703	7,984	8,341	8,794	9,347	10,043	10,944
44.0	7,243	7,335	7,469	7,648	7,880	8,169	8,533	8,997	9,563	10,175	11,197

Table 39.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 1½ to 1.

Depth of center cut in feet	Surface slope of ground in per cent										
	10	15	20	25	30	35	40	45	50	55	60
0.5	.1	1	1	1	1	1	1	2	2	2	6
1.0	6	6	7	7	7	8	9	11	13	18	29
1.5	12	13	13	14	15	17	19	22	28	39	65
2.0	23	23	24	26	28	31	34	41	51	70	117
2.5	36	37	38	41	44	48	55	64	80	109	183
3.0	51	53	55	58	63	69	78	92	114	157	263
3.5	70	72	75	79	85	94	106	125	155	213	357
4.0	91	94	98	104	112	123	139	163	203	278	467
4.5	113	118	124	132	141	155	176	206	257	352	590
5.0	142	146	153	162	174	192	217	255	318	435	.730
5.5	172	177	185	195	211	232	262	309	384	526	882
6.0	205	211	220	233	251	276	312	368	457	624	1,051
6.5	240	248	258	273	295	324	367	431	537	735	1,233
7.0	278	287	299	317	341	375	425	500	622	852	1,430
7.5	319	329	343	363	391	430	488	574	714	978	1,641
8.0	364	375	391	414	446	491	556	654	813	1,113	1,870
8.5	411	423	441	467	503	555	627	738	918	1,257	2,107
9.0	460	474	495	524	564	622	703	827	1,029	1,409	2,364
9.5	513	528	552	583	628	691	783	922	1,146	1,569	2,633
10.0	569	585	611	647	697	765	868	1,021	1,271	1,740	2,919
10.5	627	645	673	712	768	844	956	1,125	1,401	1,918	3,217
11.0	687	708	739	781	843	927	1,049	1,235	1,537	2,104	3,531
11.5	752	774	808	855	922	1,013	1,149	1,350	1,680	2,301	3,860
12.0	819	843	879	931	1,003	1,103	1,250	1,470	1,829	2,504	4,203
12.5	888	914	954	1,010	1,089	1,197	1,356	1,595	1,985	2,717	4,560
13.0	961	989	1,032	1,093	1,178	1,295	1,467	1,725	2,147	2,939	4,933
13.5	1,036	1,066	1,112	1,178	1,269	1,396	1,581	1,860	2,316	3,170	5,318
14.0	1,114	1,147	1,196	1,267	1,365	1,502	1,701	2,001	2,489	3,410	5,721
14.5	1,195	1,230	1,284	1,359	1,465	1,612	1,825	2,146	2,669	3,657	6,136
15.0	1,279	1,316	1,374	1,454	1,568	1,724	1,952	2,297	2,857	3,914	6,567
15.5	1,366	1,406	1,467	1,553	1,674	1,841	2,085	2,453	3,051	4,179	7,012
16.0	1,455	1,498	1,563	1,654	1,784	1,961	2,221	2,613	3,250	4,453	7,472
16.5	1,547	1,593	1,662	1,759	1,897	2,085	2,362	2,779	3,456	4,735	7,945
17.0	1,643	1,691	1,765	1,868	2,014	2,214	2,507	2,951	3,670	5,027	8,435
17.5	1,741	1,792	1,870	1,979	2,134	2,346	2,656	3,126	3,889	5,326	8,937
18.0	1,841	1,896	1,979	2,094	2,258	2,482	2,809	3,308	4,114	5,636	9,456
18.5	1,945	2,002	2,090	2,212	2,385	2,622	2,967	3,494	4,346	5,953	9,988
19.0	2,051	2,111	2,205	2,334	2,516	2,766	3,130	3,686	4,585	6,279	10,535
19.5	2,160	2,225	2,322	2,458	2,650	2,913	3,299	3,881	4,828	6,614	11,097
20.0	2,272	2,341	2,442	2,586	2,787	3,064	3,472	4,083	5,079	6,957	11,673
20.5	2,387	2,460	2,566	2,717	2,929	3,220	3,648	4,289	5,337	7,310	12,265
21.0	2,506	2,581	2,692	2,851	3,073	3,379	3,828	4,502	5,600	7,670	12,871
21.5	2,627	2,705	2,822	2,988	3,221	3,541	4,013	4,719	5,870	8,040	13,491
22.0	2,751	2,832	2,955	3,129	3,373	3,708	4,201	4,941	6,147	8,417	14,127
22.5	2,877	2,962	3,090	3,272	3,527	3,878	4,394	5,168	6,429	8,804	14,775

Table 39.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 1½ to 1.—Continued.

Depth of center cut in feet	Surface slope of ground in per cent										
	10	15	20	25	30	35	40	45	50	55	60
22.0	3,007	3,096	3,229	3,420	3,686	4,053	4,592	5,400	6,718	9,201	15,440
22.5	3,139	3,232	3,372	3,570	3,848	4,231	4,794	5,638	7,013	9,606	16,118
24.0	3,274	3,371	3,517	3,724	4,014	4,413	5,000	5,881	7,314	10,019	16,812
24.5	3,412	3,513	3,665	3,881	4,183	4,599	5,211	6,129	7,622	10,441	17,519
25.0	3,552	3,657	3,816	4,040	4,355	4,788	5,425	6,382	7,936	10,871	18,242
25.5	3,695	3,804	3,970	4,203	4,531	4,981	5,644	6,639	8,256	11,310	18,978
26.0	3,842	3,954	4,128	4,370	4,711	5,178	5,868	6,902	8,584	11,758	19,731
26.5	3,991	4,109	4,288	4,539	4,892	5,380	6,095	7,169	8,917	12,215	20,497
27.0	4,144	4,266	4,451	4,712	5,080	5,585	6,328	7,443	9,257	12,680	21,277
27.5	4,298	4,425	4,617	4,888	5,270	5,793	6,564	7,721	9,603	13,153	22,072
28.0	4,456	4,588	4,786	5,068	5,464	6,006	6,805	8,005	9,956	13,637	22,881
28.5	4,616	4,753	4,958	5,250	5,661	6,223	7,050	8,292	10,314	14,128	23,706
29.0	4,779	4,921	5,134	5,436	5,860	6,443	7,300	8,586	10,680	14,627	24,546
29.5	4,946	5,093	5,313	5,626	6,064	6,667	7,555	8,885	11,052	15,136	25,399
30.0	5,115	5,267	5,495	5,818	6,272	6,895	7,813	9,189	11,429	15,654	26,268
30.5	5,287	5,444	5,680	6,014	6,482	7,127	8,076	9,497	11,813	16,181	27,150
31.0	5,462	5,624	5,868	6,213	6,697	7,363	8,342	9,811	12,203	16,715	28,047
31.5	5,639	5,806	6,058	6,414	6,914	7,602	8,613	10,130	12,600	17,259	28,958
32.0	5,820	5,992	6,252	6,619	7,136	7,845	8,889	10,455	13,004	17,811	29,885
32.5	6,003	6,180	6,449	6,828	7,360	8,092	9,169	10,784	13,413	18,372	30,826
33.0	6,189	6,372	6,649	7,040	7,589	8,343	9,453	11,119	13,829	18,941	31,782
33.5	6,378	6,567	6,852	7,255	7,821	8,598	9,742	11,458	14,251	19,520	32,753
34.0	6,570	6,764	7,057	7,472	8,055	8,856	10,034	11,802	14,680	20,105	33,738
34.5	6,764	6,964	7,266	7,693	8,294	9,118	10,331	12,151	15,115	20,701	34,738
35.0	6,962	7,168	7,479	7,919	8,537	9,385	10,634	12,506	15,557	21,307	35,754
35.5	7,162	7,374	7,694	8,147	8,783	9,655	10,940	12,865	16,004	21,921	36,782
36.0	7,366	7,584	7,913	8,378	9,032	9,929	11,250	13,230	16,458	22,542	37,826
36.5	7,572	7,796	8,134	8,612	9,284	10,206	11,565	13,601	16,919	23,172	38,884
37.0	7,780	8,011	8,359	8,850	9,540	10,482	11,883	13,977	17,386	23,812	39,958
37.5	7,991	8,229	8,585	9,090	9,799	10,773	12,206	14,356	17,857	24,461	41,045
38.0	8,206	8,450	8,816	9,334	10,062	11,062	12,535	14,742	18,337	25,116	42,148
38.5	8,424	8,674	9,050	9,582	10,329	11,356	12,867	15,133	18,823	25,781	43,266
39.0	8,644	8,900	9,286	9,832	10,599	11,652	13,203	15,528	19,315	26,455	44,398
39.5	8,867	9,130	9,526	10,086	10,873	11,952	13,544	15,929	19,814	27,137	45,545
40.0	9,093	9,363	9,769	10,343	11,150	12,258	13,889	16,335	20,319	27,829	46,699
40.5	9,322	9,598	10,014	10,603	11,430	12,567	14,236	16,745	20,829	28,529	47,873
41.0	9,554	9,836	10,263	10,867	11,714	12,879	14,590	17,163	21,346	29,238	49,062
41.5	9,788	10,078	10,515	11,133	12,002	13,195	14,950	17,584	21,870	29,955	50,265
42.0	10,025	10,322	10,770	11,403	12,293	13,515	15,313	18,010	22,401	30,682	51,483
42.5	10,266	10,569	11,028	11,677	12,587	13,838	15,679	18,441	22,937	31,417	52,716
43.0	10,509	10,819	11,289	11,953	12,885	14,166	16,049	18,877	23,480	32,160	53,963
43.5	10,754	11,072	11,553	12,233	13,186	14,497	16,425	19,319	24,029	32,912	55,225
44.0	11,003	11,329	11,821	12,516	13,492	14,833	16,805	19,766	24,586	33,674	56,506

Table 40.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 2 to 1.

Depth of center cut in feet	Surface slope of ground in per cent							
	10	15	20	25	30	35	40	45
0.5	2	2	2	3	3	4	5	10
1.0	7	8	8	9	11	14	20	38
1.5	18	19	20	23	26	33	47	87
2.0	31	33	36	40	47	58	83	156
2.5	48	51	55	61	72	90	128	244
3.0	70	74	80	89	104	131	186	352
3.5	95	100	109	121	142	178	252	479
4.0	124	131	142	158	186	233	330	623
4.5	157	165	179	200	235	294	417	788
5.0	193	203	221	247	289	363	514	972
5.5	233	246	267	299	350	439	622	1,176
6.0	278	293	318	356	417	523	741	1,400
6.5	326	344	373	417	489	614	869	1,643
7.0	378	399	432	484	568	712	1,008	1,906
7.5	434	458	496	556	652	817	1,158	2,189
8.0	493	521	564	632	741	929	1,317	2,491
8.5	557	588	637	713	837	1,049	1,486	2,819
9.0	625	659	715	800	938	1,176	1,667	3,160
9.5	697	735	797	892	1,046	1,312	1,857	3,521
10.0	772	814	883	988	1,159	1,453	2,058	3,903
10.5	851	897	973	1,089	1,278	1,601	2,269	4,304
11.0	933	984	1,067	1,095	1,401	1,754	2,489	4,722
11.5	1,020	1,076	1,167	1,307	1,532	1,920	2,721	5,162
12.0	1,111	1,172	1,270	1,423	1,668	2,091	2,963	5,621
12.5	1,205	1,271	1,377	1,543	1,810	2,268	3,215	6,099
13.0	1,304	1,375	1,490	1,669	1,959	2,453	3,478	6,597
13.5	1,406	1,483	1,507	1,800	2,112	2,644	8,750	7,113
14.0	1,513	1,595	1,729	1,936	2,271	2,846	4,033	7,649
14.5	1,622	1,711	1,854	2,076	2,436	3,053	4,325	8,203
15.0	1,736	1,832	1,985	2,223	2,608	3,268	4,630	8,779
15.5	1,854	1,956	2,119	2,374	2,784	3,489	4,944	9,378
16.0	1,975	2,084	2,257	2,529	2,966	3,718	5,268	8,986
16.5	2,101	2,217	2,401	2,690	3,155	3,954	5,603	10,625
17.0	2,230	2,353	2,549	2,856	3,349	4,197	5,946	11,282
17.5	2,364	2,493	2,701	3,027	3,549	4,448	6,302	11,954
18.0	2,500	2,637	2,857	3,202	3,754	4,706	6,667	12,645
18.5	2,641	2,785	3,018	3,382	3,965	4,971	7,043	13,358
19.0	2,785	2,938	3,183	3,568	4,183	5,243	7,429	14,091
19.5	2,934	3,095	3,353	3,759	4,406	5,621	7,825	14,842
20.0	3,087	3,255	3,527	3,953	4,634	5,809	8,231	15,613
20.5	3,243	3,420	3,706	4,151	4,869	6,103	8,648	16,403
21.0	3,403	3,589	3,889	4,356	5,109	6,405	9,075	17,213
21.5	3,567	3,762	4,076	4,565	5,355	6,713	9,512	18,042
22.0	3,734	3,939	4,268	4,780	5,608	7,029	9,959	18,891
22.5	3,906	4,120	4,464	5,000	5,866	7,352	10,417	19,760

Table 40.—*Amount of material in cubic yards per 100 linear feet of cut on sloping ground,*

side slopes 2 to 1—Continued.

Depth of center cut in feet	Surface slope of ground in per cent							
	10	15	20	25	30	35	40	45
23.0	4,082	4,306	4,665	5,225	6,130	7,683	10,886	20,648
23.5	4,262	4,495	4,879	5,454	6,399	8,021	11,364	21,555
24.0	4,445	4,688	5,080	5,689	6,675	8,365	11,853	22,482
24.5	4,631	4,885	5,293	5,928	6,955	8,715	12,352	23,428
25.0	4,823	5,087	5,512	6,174	7,242	9,075	12,861	24,395
25.5	5,018	5,292	5,734	6,424	7,533	9,442	13,380	25,381
26.0	5,216	5,500	5,960	6,678	7,830	9,817	13,909	26,385
26.5	5,419	5,714	6,192	6,938	8,135	10,199	14,450	27,410
27.0	5,625	5,932	6,428	7,202	8,445	10,587	15,000	28,454
27.5	5,835	6,154	6,669	7,471	8,762	10,983	15,561	29,518
28.0	6,049	6,380	6,813	7,746	9,083	11,386	16,132	30,600
28.5	6,268	6,611	7,163	8,027	9,411	11,798	16,714	31,704
29.0	6,490	6,845	7,417	8,311	9,744	12,215	17,305	32,826
29.5	6,715	7,083	7,674	8,598	10,082	12,638	17,906	33,967
30.0	6,945	7,328	7,937	8,891	10,428	13,071	18,519	35,129
30.5	7,178	7,572	8,204	9,188	10,779	13,510	19,141	36,309
31.0	7,415	7,821	8,475	9,491	11,135	13,954	19,773	37,509
31.5	7,657	8,075	8,750	9,801	11,497	14,410	20,417	38,729
32.0	7,902	8,333	9,030	10,115	11,865	14,871	21,071	39,968
32.5	8,150	8,596	9,314	10,434	12,238	15,339	21,735	41,227
33.0	8,403	8,863	9,603	10,758	12,617	15,815	22,409	42,506
33.5	8,660	9,133	9,896	11,086	13,002	16,298	23,093	43,803
34.0	8,920	9,408	10,194	11,419	13,393	16,788	23,787	45,120
34.5	9,184	9,687	10,496	11,757	13,791	17,286	24,492	46,457
35.0	9,452	9,970	10,802	12,100	14,194	17,791	25,207	47,813
35.5	9,724	10,257	11,113	12,447	14,602	18,302	25,932	49,189
36.0	10,000	10,548	11,429	12,800	15,016	18,820	26,668	50,585
36.5	10,280	10,843	11,749	13,158	15,436	19,346	27,414	52,000
37.0	10,563	11,142	12,073	13,522	15,861	19,880	28,170	53,434
37.5	10,850	11,445	12,401	13,891	16,293	20,422	28,937	54,888
38.0	11,142	11,752	12,733	14,264	16,730	20,971	29,713	56,361
38.5	11,437	12,063	13,071	14,642	17,174	21,527	30,500	57,855
39.0	11,737	12,378	13,413	15,025	17,623	22,190	31,297	59,368
39.5	12,039	12,697	13,759	15,413	18,078	22,660	32,104	60,906
40.0	12,346	13,021	14,110	15,805	18,539	23,237	32,923	62,451
40.5	12,656	13,349	14,465	16,202	19,006	23,821	33,752	64,021
41.0	12,971	13,681	14,824	16,605	19,479	24,414	34,590	65,611
41.5	13,290	14,017	15,187	17,013	19,957	25,012	35,438	67,221
42.0	13,612	14,357	15,556	17,425	20,441	25,619	36,298	68,851
42.5	13,938	14,701	15,929	17,842	20,930	26,231	37,168	70,501
43.0	14,267	15,049	16,306	18,264	21,424	26,852	38,047	72,170
43.5	14,601	15,401	16,687	18,691	21,925	27,481	38,937	73,858
44.0	14,939	15,757	17,073	19,124	22,432	28,116	39,837	75,565

Table 41.—*Three-halves powers of numbers,* 0.000 to 1.499.

Number	.000	.001	.002	.003	.004	.005	.006	.007	.008	.009
0.00	.0000	.0001	.0002	.0003	.0004	.0005	.0006	.0007	.0008	.0009
.01	.0010	.0012	.0014	.0015	.0017	.0019	.0021	.0022	.0024	.0026
.02	.0028	.0030	.0033	.0035	.0038	.0040	.0042	.0045	.0047	.0050
.03	.0052	.0055	.0058	.0060	.0063	.0066	.0069	.0072	.0074	.0077
.04	.0080	.0083	.0086	.0090	.0093	.0096	.0099	.0102	.0106	.0109
.05	.0112	.0116	.0119	.0122	.0126	.0130	.0133	.0136	.0140	.0144
.06	.0147	.0151	.0155	.0158	.0162	.0166	.0170	.0174	.0177	.0181
.07	.0185	.0189	.0193	.0197	.0201	.0206	.0210	.0214	.0218	.0222
.08	.0226	.0230	.0235	.0239	.0244	.0248	.0252	.0257	.0261	.0266
.09	.0270	.0275	.0279	.0284	.0288	.0293	.0298	.0302	.0307	.0311
.10	.0316	.0321	.0326	.0331	.0336	.0340	.0345	.0350	.0355	.0360
.11	.0365	.0370	.0375	.0380	.0385	.0390	.0396	.0401	.0406	.0411
.12	.0416	.0421	.0427	.0432	.0437	.0442	.0448	.0453	.0458	.0464
.13	.0469	.0474	.0480	.0486	.0491	.0496	.0502	.0508	.0513	.0518
.14	.0524	.0530	.0535	.0541	.0547	.0552	.0558	.0564	.0570	.0575
.15	.0581	.0587	.0593	.0599	.0605	.0610	.0616	.0622	.0628	.0634
.16	.0640	.0645	.0652	.0658	.0664	.0670	.0677	.0683	.0689	.0695
.17	.0701	.0707	.0714	.0720	.0726	.0732	.0739	.0745	.0751	.0758
.18	.0764	.0770	.0777	.0783	.0790	.0796	.0802	.0809	.0815	.0822
.19	.0828	.0835	.0841	.0848	.0854	.0861	.0868	.0874	.0881	.0887
.20	.0894	.0901	.0908	.0914	.0921	.0928	.0935	.0942	.0948	.0955
.21	.0962	.0969	.0976	.0983	.0990	.0997	.1004	.1011	.1018	.1025
.22	.1032	.1039	.1046	.1053	.1060	.1068	.1075	.1082	.1089	.1096
.23	.1103	.1110	.1118	.1125	.1132	.1140	.1147	.1154	.1161	.1169
.24	.1176	.1183	.1191	.1198	.1251	.1213	.1220	.1228	.1235	.1243
.25	.1250	.1258	.1265	.1273	.1280	.1288	.1296	.1303	.1311	.1318
.26	.1326	.1334	.1341	.1349	.1357	.1364	.1372	.1380	.1388	.1395
.27	.1403	.1411	.1419	.1427	.1435	.1442	.1450	.1458	.1466	.1474
.28	.1482	.1490	.1498	.1506	.1514	.1522	.1530	.1538	.1546	.1554
.29	.1562	.1570	.1578	.1586	.1594	.1602	.1611	.1619	.1627	.1635
.30	.1643	.1651	.1660	.1668	.1676	.1684	.1693	.1701	.1709	.1718
.31	.1726	.1734	.1743	.1751	.1760	.1768	.1776	.1785	.1793	.1802
.32	.1810	.1819	.1827	.1836	.1844	.1853	.1862	.1870	.1879	.1887
.33	.1896	.1905	.1913	.1922	.1931	.1940	.1948	.1957	.1966	.1974
.34	.1983	.1992	.2001	.2009	.2018	.2027	.2036	.2045	.2053	.2062
.35	.2071	.2080	.2089	.2098	.2107	.2116	.2124	.2133	.2142	.2151
.36	.2160	.2169	.2178	.2187	.2196	.2206	.2215	.2224	.2233	.2242
.37	.2251	.2260	.2269	.2278	.2287	.2296	.2306	.2315	.2324	.2333
.38	.2342	.2351	.2361	.2370	.2380	.2389	.2398	.2408	.2417	.2427
.39	.2436	.2445	.2455	.2464	.2474	.2483	.2492	.2502	.2511	.2521
.40	.2530	.2540	.2549	.2558	.2568	.2578	.2587	.2596	.2606	.2616
.41	.2625	.2635	.2644	.2654	.2664	.2674	.2683	.2693	.2703	.2712
.42	.2722	.2732	.2742	.2751	.2761	.2771	.2781	.2791	.2800	.2810
.43	.2820	.2830	.2840	.2850	.2860	.2870	.2879	.2889	.2899	.2909
.44	.2919	.2929	.2939	.2949	.2959	.2969	.2979	.2989	.2999	.3009
.45	.3019	.3029	.3039	.3049	.3059	.3070	.3080	.3090	.3100	.3110
.46	.3120	.3130	.3140	.3151	.3161	.3171	.3181	.3191	.3202	.3212
.47	.3222	.3232	.3242	.3253	.3263	.3274	.3284	.3294	.3304	.3315
.48	.3325	.3336	.3346	.3356	.3367	.3378	.3388	.3398	.3409	.3420
.49	.3430	.3441	.3451	.3462	.3472	.3483	.3494	.3504	.3515	.3525

Table 41.—*Three-halves powers of numbers,*

0.000 to **1.499**.—Continued.

Number	.000	.001	.002	.003	.004	.005	.006	.007	.008	.009
0.50	.3536	.3547	.3557	.3568	.3578	.3589	.3600	.3610	.3621	.3631
.51	.3642	.3653	.3664	.3674	.3685	.3696	.3707	.3718	.3728	.3739
.52	.3750	.3761	.3772	.3782	.3793	.3804	.3815	.3826	.3836	.3847
.53	.3858	.3869	.3880	.3891	.3902	.3913	.3924	.3935	.3946	.3957
.54	.3968	.3979	.3990	.4001	.4012	.4024	.4035	.4046	.4057	.4068
.55	.4079	.4090	.4101	.4113	.4124	.4135	.4146	.4157	.4169	.4180
.56	.4191	.4202	.4213	.4225	.4236	.4247	.4258	.4269	.4281	.4292
.57	.4303	.4314	.4326	.4337	.4349	.4360	.4371	.4383	.4394	.4406
.58	.4417	.4428	.4440	.4452	.4463	.4474	.4486	.4498	.4509	.4520
.59	.4532	.4544	.4555	.4567	.4578	.4590	.4602	.4613	.4625	.4636
.60	.4648	.4660	.4671	.4683	.4694	.4706	.4718	.4729	.4741	.4752
.61	.4764	.4776	.4788	.4799	.4811	.4823	.4835	.4847	.4858	.4870
.62	.4882	.4894	.4906	.4917	.4929	.4941	.4953	.4965	.4976	.4988
.63	.5000	.5012	.5024	.5036	.5048	.5060	.5072	.5084	.5096	.5108
.64	.5120	.5132	.5144	.5156	.5168	.5180	.5192	.5204	.5216	.5228
.65	.5240	.5252	.5264	.5277	.5289	.5301	.5313	.5325	.5338	.5350
.66	.5362	.5374	.5386	.5399	.5411	.5423	.5435	.5447	.5460	.5472
.67	.5484	.5496	.5509	.5521	.5533	.5546	.5558	.5570	.5582	.5595
.68	.5607	.5620	.5632	.5644	.5657	.5670	.5682	.5694	.5707	.5720
.69	.5732	.5744	.5757	.5770	.5782	.5794	.5807	.5820	.5832	.5844
.70	.5857	.5870	.5882	.5895	.5907	.5920	.5933	.5945	.5958	.5970
.71	.5983	.5996	.6008	.6021	.6033	.6046	.6059	.6071	.6084	.6096
.72	.6109	.6122	.6135	.6147	.6160	.6173	.6186	.6199	.6211	.6224
.73	.6237	.6250	.6263	.6276	.6289	.6302	.6314	.6327	.6340	.6353
.74	.6366	.6379	.6392	.6405	.6418	.6430	.6443	.6456	.6469	.6482
.75	.6495	.6508	.6521	.6534	.6547	.6560	.6574	.6587	.6600	.6613
.76	.6626	.6639	.6652	.6665	.6678	.6692	.6705	.6718	.6731	.6744
.77	.6757	.6770	.6783	.6797	.6810	.6823	.6836	.6849	.6863	.6876
.78	.6889	.6902	.6916	.6929	.6942	.6956	.6969	.6982	.6995	.7009
.79	.7022	.7035	.7049	.7062	.7075	.7088	.7102	.7115	.7128	.7142
.80	.7155	.7168	.7182	.7196	.7209	.7222	.7236	.7250	.7263	.7276
.81	.7290	.7304	.7317	.7330	.7344	.7358	.7371	.7384	.7398	.7412
.82	.7425	.7439	.7452	.7466	.7480	.7494	.7507	.7521	.7535	.7548
.83	.7562	.7576	.7589	.7603	.7617	.7630	.7644	.7658	.7672	.7685
.84	.7699	.7713	.7727	.7740	.7754	.7768	.7782	.7796	.7809	.7823
.85	.7837	.7851	.7865	.7878	.7892	.7906	.7920	.7934	.7947	.7961
.86	.7975	.7989	.8003	.8017	.8031	.8045	.8059	.8073	.8087	.8101
.87	.8115	.8129	.8143	.8157	.8171	.8185	.8199	.8213	.8227	.8241
.88	.8255	.8269	.8283	.8297	.8311	.8326	.8340	.8354	.8368	.8382
.89	.8396	.8410	.8424	.8439	.8453	.8467	.8481	.8495	.8510	.8524
.90	.8538	.8552	.8567	.8581	.8595	.8610	.8624	.8638	.8652	.8667
.91	.8681	.8695	.8710	.8724	.8738	.8752	.8767	.8781	.8795	.8810
.92	.8824	.8838	.8853	.8868	.8882	.8896	.8911	.8926	.8940	.8954
.93	.8969	.8984	.8998	.9012	.9027	.9042	.9056	.9070	.9085	.9100
.94	.9114	.9128	.9143	.9158	.9172	.9186	.9201	.9216	.9230	.9244
.95	.9259	.9274	.9288	.9302	.9317	.9332	.9347	.9362	.9377	.9391
.96	.9406	.9421	.9435	.9450	.9465	.9480	.9494	.9509	.9524	.9538
.97	.9553	.9568	.9583	.9598	.9613	.9628	.9642	.9657	.9672	.9687
.98	.9702	.9717	.9732	.9746	.9761	.9776	.9791	.9806	.9820	.9835
.99	.9850	.9865	.9880	.9895	.9910	.9925	.9940	.9955	.9970	.9985

Table 41.—*Three-halves powers of numbers,* **0.000** to **1.499**.—Continued.

Number	.000	.001	.002	.003	.004	.005	.006	.007	.008	.009
1.00	1.0000	1.0015	1.0030	1.0045	1 0060	1.0075	1.0090	1.0105	1.0120	1.0135
1.01	1.0150	1.0165	1.0180	1.0196	1.0211	1.0226	1.0241	1.0256	1.0272	1.0287
1.02	1.0302	1.0317	1.0332	1.0347	1.0362	1.0378	1.0393	1.0408	1.0428	1.0438
1.03	1.0453	1.0468	1.0484	1.0499	1.0514	1.0530	1.0545	1.0560	1.0575	1.0591
1.04	1.0606	1.0621	1.0637	1.0652	1.0667	1.0682	1.0698	1.0713	1.0728	1.0744
1.05	1.0759	1.0774	1.0790	1.0805	1.0821	1.0836	1.0851	1.0867	1.0882	1.0898
1.06	1.0913	1.0928	1.0944	1.0960	1.0975	1.0990	1.1006	1.1022	1.1037	1.1052
1.07	1.1068	1.1084	1.1099	1.1115	1.1130	1.1146	1.1162	1.1177	1.1193	1.1208
1.08	1.1224	1.1240	1.1255	1.1271	1.1286	1.1302	1.1318	1.1333	1.1349	1.1364
1.09	1.1380	1.1396	1.1411	1.1427	1.1443	1.1458	1.1474	1.1490	1.1506	1.1521
1.10	1.1537	1.1553	1.1569	1.1584	1.1600	1.1616	1.1632	1.1648	1.1663	1.1679
1.11	1.1695	1.1711	1.1727	1.1742	1.1758	1.1774	1.1790	1.1806	1.1821	1.1837
1.12	1.1853	1.1869	1.1885	1.1901	1.1917	1.1932	1.1948	1.1964	1.1980	1.1996
1.13	1.2012	1.2028	1.2044	1.2060	1.2076	1.2092	1.2108	1.2124	1.2140	1.2156
1.14	1.2172	1.2188	1.2204	1.2220	1.2236	1.2252	1.2268	1.2284	1.2300	1.2316
1.15	1.2332	1.2348	1.2364	1.2381	1.2397	1.2413	1.2429	1.2445	1.2462	1.2478
1.16	1.2494	1.2510	1.2526	1.2543	1.2559	1.2575	1.2591	1.2607	1.2624	1.2640
1.17	1.2656	1.2672	1.2688	1.2705	1.2721	1.2737	1.2753	1.2769	1.2786	1.2802
1.18	1.2818	1.2834	1.2851	1.2867	1.2883	1.2900	1.2916	1.2932	1.2948	1.2965
1.19	1.2981	1.2997	1.3014	1.3030	1.3047	1.3063	1.3079	1.3096	1.3112	1.3129
1.20	1.3145	1.3162	1.3178	1.3194	1.3211	1.3228	1.3244	1.3260	1.3277	1.3294
1.21	1.3310	1.3326	1.3343	1.3360	1.3376	1.3392	1.3409	1.3426	1.3442	1.3458
1.22	1.3475	1.3492	1.3508	1.3525	1.3541	1.3558	1.3575	1.3591	1.3608	1.3624
1.23	1.3641	1.3658	1.3674	1.3691	1.3768	1.3724	1.3741	1.3758	1.3775	1.3791
1.24	1.3808	1.3825	1.3841	1.3858	1.3875	1.3892	1.3908	1.3925	1.3942	1.3958
1.25	1.3975	1.3992	1.4009	1.4026	1.4043	1.4060	1.4076	1.4093	1.4110	1.4127
1.26	1.4144	1.4161	1.4178	1.4194	1.4211	1.4228	1.4245	1.4262	1.4278	1.4295
1.27	1.4312	1.4329	1.4346	1.4363	1.4380	1.4397	1.4414	1.4431	1.4448	1.4465
1.28	1.4482	1.4499	1.4516	1.4533	1.4550	1.4567	1.4584	1.4601	1.4618	1.4635
1.29	1.4652	1.4669	1.4686	1.4703	1.4720	1.4737	1.4754	1.4771	1.4788	1.4805
1.30	1.4822	1.4839	1.4856	1.4874	1.4891	1.4908	1.4925	1.4942	1.4960	1.4977
1.31	1.4994	1.5011	1.5028	1.5046	1.5063	1.5080	1.5097	1.5114	1.5132	1.5149
1.32	1.5166	1.5183	1.5200	1.5218	1.5235	1.5252	1.5269	1.5286	1.5304	1.5321
1.33	1.5338	1.5355	1.5373	1.5390	1.5408	1.5425	1.5442	1.5460	1.5477	1.5495
1.34	1.5512	1.5529	1.5547	1.5564	1.5582	1.5599	1.5616	1.5634	1.5651	1.5669
1.35	1.5686	1.5703	1.5721	1.5738	1.5756	1.5773	1.5790	1.5808	1.5825	1.5843
1.36	1.5860	1.5878	1.5895	1.5912	1.5930	1.5948	1.5965	1.5982	1.6000	1.6018
1.37	1.6035	1.6053	1.6070	1.6088	1.6105	1.6123	1.6141	1.6158	1.6176	1.6193
1.38	1.6211	1.6229	1.6246	1.6264	1.6282	1.6300	1.6317	1.6335	1.6353	1.6370
1.39	1.6388	1.6406	1.6423	1.6441	1.6459	1.6476	1.6494	1.6512	1.6530	1.6547
1.40	1.6565	1.6583	1.6601	1.6618	1.6636	1.6654	1.6672	1.6690	1.6708	1.6725
1.41	1.6743	1.6761	1.6779	1.6796	1.6814	1.6832	1.6850	1.6868	1.6885	1.6903
1.42	1.6921	1.6939	1.6957	1.6975	1.6993	1.7010	1.7028	1.7046	1.7064	1.7082
1.43	1.7100	1.7118	1.7136	1.7154	1.7172	1.7190	1.7208	1.7226	1.7244	1.7262
1.44	1.7280	1.7298	1.7316	1.7334	1.7352	1.7370	1.7388	1.7406	1.7424	1.7442
1.45	1.7460	1.7478	1.7496	1.7514	1.7532	1.7550	1.7569	1.7587	1.7605	1.7623
1.46	1.7641	1.7659	1.7677	1.7696	1.7714	1.7732	1.7750	1.7768	1.7787	1.7805
1.47	1.7823	1.7841	1.7859	1.7878	1.7896	1.7914	1.7932	1.7950	1.7969	1.7987
1.48	1.8005	1.8023	1.8042	1.8060	1.8078	1.8096	1.8115	1.8133	1.8151	1.8170
1.49	1.8188	1.8206	1.8225	1.8243	1.8261	1.8280	1.8298	1.8316	1.8334	1.8353

Table 42.—*Three-halves powers of numbers,*

1.50 to 19.99.

Number	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
1.5	1.838	1.856	1.874	1.892	1.911	1.930	1.948	1.967	1.986	2.005
1.6	2.024	2.043	2.062	2.081	2.100	2.120	2.139	2.158	2.178	2.197
1.7	2.216	2.236	2.256	2.276	2.295	2.315	2.335	2.355	2.375	2.395
1.8	2.415	2.435	2.455	2.476	2.496	2.516	2.537	2.557	2.578	2.598
1.9	2.619	2.640	2.660	2.681	2.702	2.723	2.744	2.765	2.786	2.807
2.0	2.828	2.850	2.871	2.892	2.914	2.935	2.957	2.978	3.000	3.022
2.1	3.043	3.065	3.087	3.109	3.131	3.152	3.174	3.197	3.219	3.241
2.2	3.263	3.285	3.308	3.330	3.352	3.375	3.398	3.420	3.443	3.465
2.3	3.488	3.511	3.534	3.557	3.580	3.602	3.626	3.649	3.672	3.695
2.4	3.718	3.741	3.765	3.788	3.811	3.835	3.858	3.882	3.906	3.929
2.5	3.953	3.977	4.000	4.024	4.048	4.072	4.096	4.120	4.144	4.168
2.6	4.192	4.217	4.241	4.265	4.290	4.314	4.338	4.363	4.387	4.412
2.7	4.437	4.461	4.486	4.511	4.536	4.560	4.585	4.610	4.635	4.660
2.8	4.685	4.710	4.736	4.761	4.786	4.811	4.837	4.862	4.888	4.913
2.9	4.938	4.964	4.990	5.015	5.041	5.067	5.093	5.118	5.144	5.170
3.0	5.196	5.222	5.248	5.274	5.300	5.327	5.353	5.379	5.405	5.432
3.1	5.458	5.484	5.511	5.538	5.564	5.591	5.617	5.644	5.671	5.698
3.2	5.724	5.751	5.778	5.805	5.832	5.859	5.886	5.913	5.940	5.968
3.3	5.995	6.022	6.049	6.077	6.104	6.132	6.159	6.186	6.214	6.242
3.4	6.269	6.297	6.325	6.352	6.380	6.408	6.436	6.464	6.492	6.520
3.5	6.548	6.576	6.604	6.632	6.660	6.689	6.717	6.745	6.774	6.802
3.6	6.830	6.859	6.888	6.916	6.945	6.973	7.002	7.031	7.060	7.088
3.7	7.117	7.146	7.175	7.204	7.233	7.262	7.291	7.320	7.349	7.378
3.8	7.408	7.437	7.466	7.496	7.525	7.554	7.584	7.613	7.643	7.672
3.9	7.702	7.732	7.770	7.791	7.821	7.850	7.880	7.910	7.940	7.970
4.0	8.000	8.030	8.060	8.090	8.120	8.150	8.181	8.211	8.241	8.272
4.1	8.302	8.332	8.363	8.393	8.424	8.454	8.485	8.515	8.546	8.577
4.2	8.607	8.638	8.669	8.700	8.731	8.762	8.792	8.824	8.854	8.886
4.3	8.917	8.948	8.979	9.010	9.041	9.073	9.104	9.135	9.167	9.198
4.4	9.230	9.261	9.292	9.324	9.356	9.387	9.419	9.451	9.482	9.514
4.5	9.546	9.578	9.610	9.642	9.674	9.706	9.738	9.770	9.802	9.834
4.6	9.866	9.898	9.930	9.963	9.995	10.03	10.06	10.09	10.12	10.16
4.7	10.19	10.22	10.25	10.29	10.32	10.35	10.39	10.42	10.45	10.48
4.8	10.52	10.55	10.58	10.62	10.65	10.68	10.71	10.75	10.78	10.81
4.9	10.85	10.88	10.91	10.95	10.98	11.01	11.05	11.08	11.11	11.15
5.0	11.18	11.21	11.25	11.28	11.31	11.35	11.38	11.42	11.45	11.48
5.1	11.52	11.55	11.59	11.62	11.65	11.69	11.72	11.76	11.79	11.82
5.2	11.86	11.89	11.93	11.96	11.99	12.03	12.06	12.10	12.13	12.17
5.3	12.20	12.24	12.27	12.31	12.34	12.37	12.41	12.44	12.48	12.51
5.4	12.55	12.58	12.62	12.65	12.69	12.72	12.76	12.79	12.83	12.86
5.5	12.90	12.93	12.97	13.00	13.04	13.07	13.11	13.15	13.18	13.22
5.6	13.25	13.29	13.32	13.36	13.39	13.43	13.47	13.50	13.54	13.57
5.7	13.61	13.64	13.68	13.72	13.75	13.79	13.82	13.86	13.90	13.93
5.8	13.97	14.00	14.04	14.08	14.11	14.15	14.19	14.22	14.26	14.29
5.9	14.33	14.37	14.40	14.44	14.48	14.51	14.55	14.59	14.62	14.66
6.0	14.70	14.73	14.77	14.81	14.84	14.88	14.92	14.95	14.99	15.03

Table 42.—*Three-halves powers of numbers* **1.50** to **19.99**—Continued.

Number	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
6.1	15.07	15.10	15.14	15.18	15.21	15.25	15.29	15.33	15.36	15.40
6.2	15.44	15.48	15.51	15.55	15.59	15.62	15.66	15.70	15.74	15.78
6.3	15.81	15.85	15.89	15.93	15.96	16.00	16.04	16.08	16.12	16.15
6.4	16.19	16.23	16.27	16.30	16.34	16.38	16.42	16.46	16.50	16.53
6.5	16.57	16.61	16.65	16.69	16.72	16.76	16.80	16.84	16.88	16.92
6.6	16.96	16.99	17.03	17.07	17.11	17.15	17.19	17.22	17.26	17.30
6.7	17.34	17.38	17.42	17.46	17.50	17.54	17.58	17.62	17.65	17.69
6.8	17.73	17.77	17.81	17.85	17.89	17.93	17.97	18.01	18.05	18.09
6.9	18.12	18.16	18.20	18.24	18.28	18.32	18.36	18.40	18.44	18.48
7.0	18.52	18.56	18.60	18.64	18.68	18.72	18.76	18.80	18.84	18.88
7.1	18.92	18.96	19.00	19.04	19.08	19.12	19.16	19.20	19.24	19.28
7.2	19.32	19.36	19.40	19.44	19.48	19.52	19.56	19.60	19 64	19.68
7.3	19.72	19.76	19.80	19.85	19.89	19.93	19.97	20 01	20.05	20.09
7.4	20.13	20.17	20.21	20.25	20.29	20.33	20 38	20.42	20.46	20.50
7.5	20.54	20.58	20.62	20.66	20.70	20.75	20.79	20.83	20.87	20.91
7.6	20.95	20.99	21.03	21.08	21.12	21.16	21.20	21.24	21.28	21.32
7.7	21.37	21.41	21.45	21.49	21.53	21.58	21.62	21.66	21.70	21.74
7.8	21.78	21.83	21.87	21.91	21.95	21.99	22.04	22.08	22.12	22.16
7.9	22.20	22.25	22.29	22.33	22.37	22.42	22.46	22.50	22.54	22.58
8.0	22.63	22.67	22.71	22.75	22.80	22.84	22.88	22.93	22.97	23.01
8.1	23.05	23.10	23.14	23.18	23.22	23.27	23.31	23.35	23.40	23.44
8.2	23.48	23.52	23.57	23.61	23.65	23.70	23.74	23.78	23.83	23.87
8.3	23.91	23.96	24.00	24.04	24.09	24.13	24.17	24.22	24.26	24.30
8.4	24.35	24.39	24.43	24.48	24.52	24.56	24.61	24.65	24.69	24.74
8.5	24.78	24.83	24.87	24.91	24.96	25.00	25.04	25.09	25.13	25.18
8.6	25.22	25.26	25.31	25.35	25.40	25.44	25.48	25.53	25.57	25.62
8.7	25.66	25.71	25.75	25.79	25.84	25.88	25.93	25.97	26.02	26.06
8.8	26.10	26.15	26.19	26.24	26.28	26.33	26.37	26.42	26.46	26.51
8.9	26.55	26.60	26.64	26.69	26.73	26.78	26.82	26.87	26.91	26.96
9.0	27.00	27.04	27.09	27.14	27.18	27.23	27.27	27.32	27.36	27.41
9.1	27.45	27.50	27.54	27.59	27.63	27.68	27.72	27.77	27.81	27.86
9.2	27.90	27.95	28.00	28.04	28.09	28.13	28.18	28.22	28.27	28.32
9.3	28.36	28.41	28.45	28.50	28.54	28.59	28.64	28.68	28.73	28.77
9.4	28.82	28.87	28.91	28.96	29.00	29.05	29.10	29.14	29.19	29.23
9.5	29.28	29.33	29.37	29.42	29.47	29.51	29.56	29.61	29.65	29.70
9.6	29.74	29.79	29.84	29.88	29.93	29.98	30.02	30.07	30.12	30.16
9.7	30.21	30.26	30.30	30.35	30.40	30.44	30.49	30.54	30.58	30.63
9.8	30.68	30.73	30.77	30.82	30.87	30.91	30.96	31.01	31.06	31.10
9.9	31.15	31.20	31.24	31.29	31.34	31.38	31.43	31.48	31.53	31.58
10.0	31.62	31.67	31.72	31.77	31.81	31.86	31.91	31.96	32.00	32.05
10.1	32.10	32.15	32.19	32.24	32.29	32.34	32.38	32.43	32.48	32.53
10.2	32.58	32.62	32.67	32.72	32.77	32.82	32.86	32.91	32.96	33.01
10.3	33.06	33.10	33.15	33.20	33.25	33.30	33.35	33.39	33.44	33.49
10.4	33.54	33.59	33.64	33.68	33.73	33.78	33.83	33.88	33.93	33.98
10.5	34.02	34.07	34.12	34.17	34.22	34.27	34.32	34.36	34.41	34.46
10.6	34.51	34.56	34.61	34.66	34.71	34.76	34.80	34.85	34.90	34.95

Table 42.—*Three-halves powers of numbers,*

1.50 to 19.99—Continued.

Number	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
10.7	35.00	35.05	35.10	35.15	35.20	35.25	35.30	35.34	35.39	35.44
10.8	35.49	35.54	35.59	35.64	35.69	35.74	35.79	35.84	35.89	35.94
10.9	35.99	36.04	36.09	36.14	36.18	36.23	36.28	36.33	36.38	36.43
11.0	36.48	36.53	36.58	36.63	36.68	36.73	36.78	36.83	36.88	36.93
11.1	36.98	37.03	37.08	37.13	37.18	37.23	37.28	37.33	37.38	37.43
11.2	37.48	37.53	37.58	37.63	37.68	37.73	37.78	37.83	37.88	37.94
11.3	37.99	38.04	38.09	38.14	38.19	38.24	38.29	38.34	38.39	38.44
11.4	38.49	38.54	38.59	38.64	38.69	38.74	38 80	38.85	38.90	38.95
11.5	39.00	39.05	39.10	39.15	39.20	39.25	39 30	39.36	39.41	39.46
11.6	39.51	39.56	39.61	39.66	39.71	39.76	39.82	39.87	39.92	39.97
11.7	40.02	40.07	40.12	40.17	40.23	40.28	40.33	40.38	40.43	40.48
11.8	40.53	40.59	40.64	40.69	40.74	40.79	40.84	40.90	40.95	41.00
11.9	41.05	41.10	41.15	41.21	41.26	41.31	41.36	41.41	41.47	41.52
12.0	41.57	51.62	41.67	41.72	41.78	41.83	41.88	41.93	41.99	42.04
12.1	42.09	42.14	42.19	42.25	42.30	42.35	42.40	42.45	42.51	42.56
12.2	42.61	42.66	42.72	42.77	42.82	42.87	42.93	42.98	43.03	43.09
12.3	43.14	43.19	43.24	43.30	43.35	43.40	43.45	43.51	43.56	43.61
12.4	43.66	43.72	43.77	43.82	43.88	43.93	43.98	44.04	44.09	44.14
12.5	44.19	44.25	44.30	44.35	44.41	44.46	44.51	44.56	44.62	44.67
12.6	44.73	44.78	44.83	44.89	44.94	44.99	45.05	45.10	45.15	45.21
12.7	45.26	45.31	45.37	45.42	45.47	45.53	45.58	45.63	45.69	45.74
12.8	45.79	45.85	45.90	45.96	46.01	46.06	46.12	46.17	46.22	46.28
12.9	46.33	46.39	46.44	46.49	46.55	46.60	46.66	46.71	46.76	46.82
13.0	46.87	46.93	46.98	47.03	47.09	47.14	47.20	47.25	47.31	47.36
13.1	47.41	47.47	47.52	47.58	47.63	47.69	47.74	47.79	47.85	47.90
13.2	47.96	48.01	48.07	48.12	48.18	48.23	48.28	48.34	48.39	48.45
13.3	48.50	48.56	48.61	48.67	48.72	48.78	48.83	48.89	48.94	49.00
13.4	49.05	49.11	49.16	49.22	49.27	49.33	49.38	49.44	49.49	49.55
13.5	49.60	49.66	49.71	49.77	49.82	49.88	49.93	49.99	50.04	50.10
13.6	50.15	50.21	50.26	50.32	50.37	50.43	50.48	50.54	50.59	50.65
13.7	50.71	50.76	50.82	50.87	50.93	50.99	51.04	51.10	51.15	51.21
13.8	51.26	51.32	51.38	51.43	51.49	51.54	51.60	51.66	51.71	51.77
13.9	51.82	51.88	51.93	51.99	52.05	52.10	52.16	52.21	52.27	52.33
14.0	52.38	52.44	52.50	52.55	52.61	52.66	52.72	52.78	52.83	52.89
14.1	52.95	53.00	53.06	53.11	53.17	53.23	53.28	53.34	53.40	53.45
14.2	53.51	53.57	53.62	53.68	53.74	53.79	53.85	53.91	53.96	54.02
14.3	54.08	54.13	54.19	54.25	54.30	54.36	54.42	54.47	54.53	54.59
14.4	54.64	54.70	54.76	54.81	54.87	54.93	54.98	55.04	55.10	55.16
14.5	55.21	55.27	55.33	55.39	55.44	55.50	55.56	55.61	55.67	55.73
14.6	55.79	55.84	55.90	55.96	56.02	56.07	56.13	56.19	56.25	56.30
14.7	56.36	56.42	56.48	56.53	56.59	56.65	56.71	56.76	56.82	56.88
14.8	56.94	56.99	57.05	57.11	57.17	57.23	57.28	57.34	57.40	57.46
14.9	57.51	57.57	57.63	57.69	57.75	57.80	57.86	57.92	57.98	58.04
15.0	58.09	58.15	58.21	58.27	58.33	58.38	58.44	58.50	58.56	58.62
15.1	58.68	58.73	58.79	58.85	58.91	58.97	59.03	59.09	59.14	59.20
15.2	59.26	59.32	59.38	59.44	59.49	59.55	59.61	59.67	59.73	59.79

Table 42.—*Three-halves powers of numbers,*

1.50 to 19.99—Continued.

Number	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
15.3	59.85	59.90	59.96	60.02	60.08	60.14	60.20	60.26	60.32	60.38
15.4	60.43	60.49	60.55	60.61	60.67	60.73	60.79	60.85	60.91	60.96
15.5	61.02	61.08	61.14	61.20	61.26	61.32	61.38	61.44	61.50	61.56
15.6	61.62	61.67	61.73	61.79	61.85	61.91	61.97	62.03	62.09	62.15
15.7	62.21	62.27	62.33	62.39	62.45	62.51	62.57	62.62	62.68	62.74
15.8	62.80	62.86	62.92	62.98	63.04	63.10	63.16	63.22	63.28	63.34
15.9	63.40	63.46	63.52	63.58	63.64	63.70	63.76	63.82	63.88	63.94
16.0	64.00	64.06	64.12	64.18	64.24	64.30	64.36	64.42	64.48	64.54
16.1	64.60	64.66	64.72	64.78	64.84	64.90	64.96	65.02	65.08	65.14
16.2	65.20	65.26	65.32	65.38	65.45	65.51	65.57	65.63	65.69	65.75
16.3	65.81	65.87	65.93	65.99	66.05	66.11	66.17	66.23	66.29	66.35
16.4	66.41	66.48	66.54	66.60	66.66	66.72	66.78	66.84	66.90	66.96
16.5	67.02	67.08	67.15	67.21	67.27	67.33	67.39	67.45	67.51	67.57
16.6	67.63	67.69	67.76	67.82	67.88	67.94	68.00	68.06	68.12	68.18
16.7	68.25	68.31	68.37	68.43	68.49	68.55	68.61	68.67	68.74	68.80
16.8	68.86	68.92	68.98	69.04	69.11	69.17	69.23	69.29	69.35	69.41
16.9	69.48	69.54	69.60	69.66	69.72	69.78	69.85	69.91	69.97	70.03
17.0	70.09	70.15	70.22	70.28	70.34	70.40	70.46	70.53	70.59	70.65
17.1	70.71	70.77	70.84	70.90	70.96	71.02	71.08	71.15	71.21	71.27
17.2	71.33	71.40	71.46	71.52	71.58	71.64	71.71	71.77	71.83	71.89
17.3	71.96	72.02	72.08	72.14	72.21	72.27	72.33	72.39	72.46	72.52
17.4	72.58	72.64	72.71	72.77	72.83	72.89	72.96	73.02	73.08	73.14
17.5	73.21	73.27	73.33	73.40	73.46	73.52	73.58	73.65	73.71	73.77
17.6	73.84	73.90	73.96	74.03	74.09	74.15	74.21	74.28	74.34	74.40
17.7	74.47	74.53	74.59	74.66	74.72	74.78	74.85	74.91	74.97	75.04
17.8	75.10	75.16	75.22	75.29	75.35	75.41	75.48	75.54	75.80	75.67
17.9	75.73	75.80	75.86	75.92	75.99	76.05	76.11	76.18	76.24	76.30
18.0	76.37	76.43	76.49	76.56	76.62	76.69	76.75	76.81	76.88	76.94
18.1	77.00	77.07	77.13	77.20	77.26	77.32	77.39	77.45	77.52	77.58
18.2	77.64	77.71	77.77	77.84	77.90	77.96	78.03	78.09	78.16	78.22
18.3	78.28	78.35	78.41	78.48	78.54	78.61	78.67	78.73	78.80	78.86
18.4	78.93	78.99	79.06	79.12	79.18	79.25	79.31	79.38	79.44	79.51
18.5	79.57	79.64	79.70	79.77	79.83	79.89	79.96	80.02	80.09	80.15
18.6	80.22	80.28	80.35	80.41	80.48	80.54	80.61	80.67	80.74	80.80
18.7	80.87	80.93	81.00	81.06	81.13	81.19	81.26	81.32	81.39	81.45
18.8	81.51	81.58	81.64	81.71	81.78	81.84	81.91	81.97	82.04	82.10
18.9	82.17	82.23	82.30	82.36	82.43	82.49	82.56	82.62	82.69	82.75
19.0	82.82	82.88	82.95	83.02	83.08	83.15	83.21	83.28	83.34	83.41
19.1	83.47	83.54	83.61	83.67	83.74	83.80	83.87	83.93	84.00	84.06
19.2	84.13	84.20	84.26	84.33	84.39	84.46	84.52	84.59	84.66	84.72
19.3	84.79	84.85	84.92	84.98	85.05	85.12	85.18	85.25	85.32	85.38
19.4	85.45	85.51	85.58	85.65	85.71	85.78	85.84	85.91	85.98	86.04
19.5	86.11	86.18	86.24	86.31	86.37	86.44	86.51	86.57	86.64	86.71
19.6	86.77	86.84	86.91	86.97	87.04	87.11	87.17	87.24	87.31	87.37
19.7	87.44	87.50	87.57	87.64	87.70	87.77	87.84	87.90	87.97	88.04
19.8	88.10	88.17	88.24	88.30	88.37	88.44	88.51	88.57	88.64	88.71
19.9	88.77	88.84	88.91	88.97	89.04	89.11	89.17	89.24	89.31	89.38

Table 43.—*Squares, cubes, square roots, cube roots, reciprocals, and area and circumference of circles of radius N.*

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$	πN^2	$2\pi N$
1	1	1	1.0000	1.0000	1.000000	3.142	6.283
2	4	8	1.4142	1.2599	.500000	12.566	12.566
3	9	27	1.7321	1.4422	.333333	28.274	18.850
4	16	64	2.0000	1.5874	.250000	50.265	25.133
5	25	125	2.2361	1.7100	.200000	78.540	31.416
6	36	216	2.4495	1.8171	.166667	113.097	37.699
7	49	343	2.6458	1.9129	.142857	153.938	43.982
8	64	512	2.8284	2.0000	.125000	201.062	50.265
9	81	729	3.0000	2.0801	.111111	254.469	56.549
10	100	1,000	3.1623	2.1544	.100000	314.159	62.832
11	121	1,331	3.3166	2.2240	.090909	380.133	69.115
12	144	1,728	3.4641	2.2894	.083333	452.389	75.398
13	169	2,197	3.6056	2.3513	.076923	530.929	81.681
14	196	2,744	3.7417	2.4101	.071429	615.752	87.965
15	225	3,375	3.8730	2.4662	.066667	706.858	94.248
16	256	4,096	4.0000	2.5198	.062500	804.248	100.531
17	289	4,913	4.1231	2.5713	.058824	907.920	106.814
18	324	5,832	4.2426	2.6207	.055556	1,017.876	1.3.097
19	361	6,859	4.3589	2.6684	.052632	1,134.115	1.9.381
20	400	8,000	4.4721	2.7144	.050000	1,256.637	125.664
21	441	9,261	4.5826	2.7589	.047619	1,385.442	131.947
22	484	10,648	4.6904	2.8020	.045455	1,520.531	138.230
23	529	12,167	4.7958	2.8439	.043478	1,661.903	144.513
24	576	13,824	4.8990	2.8845	.041667	1,809.557	150.796
25	625	15,625	5.0000	2.9240	.040000	1,963.495	157.080
26	676	17,576	5.0990	2.9625	.038462	2,123.717	163.363
27	729	19,683	5.1962	3.0000	.037037	2,290.221	169.646
28	784	21,952	5.2915	3.0366	.035714	2,463.009	1"5.929
29	841	24,389	5.3852	3.0723	.034483	2,642.079	182.212
30	900	27,000	5.4772	3.1072	.033333	2,827.433	188.496
31	961	29,791	5.5678	3.1414	.032258	3,019.071	194.779
32	1,024	32,768	5.6569	3.1748	.031250	3,216.991	201.062
33	1,089	35,937	5.7446	3.2075	.030303	3,421.194	207.345
34	1,156	39,304	5.8310	3.2396	.029412	3,631.681	213.628
35	1,225	42,875	5.9161	3.2711	.028571	3,848.451	219.911
36	1,296	46,656	6.0000	3.3019	.027778	4,071.504	226.195
37	1,369	50,653	6.0828	3.3322	.027027	4,300.840	232.478
38	1,444	54,872	6.1644	3.3620	.026316	4,536.460	238.761
39	1,521	59,319	6.2450	3.3912	.025641	4,778.362	245.044
40	1,600	64,000	6.3246	3.4200	.025000	5,026.548	251.327
41	1,681	68,921	6.4031	3.4482	.024390	5,281.017	257.611
42	1,764	74,088	6.4807	3.4760	.023810	5,541.770	263.894
43	1,849	79,507	6.5574	3.5034	.023256	5,808.806	270.177
44	1,936	85,184	6.6332	3.5303	.022727	6,082.128	276.460
45	2,025	91,125	6.7082	3.5569	.022222	6,361.725	282.743
46	2,116	97,336	6.7823	3.5830	.021739	6,647.610	289.027
47	2,209	103,823	6.8557	3.6088	.021277	6,939.778	295.310
48	2,304	110,592	6.9282	3.6342	.020833	7,238.230	301.593
49	2,401	117,649	7.0000	3.6593	.020408	7,542.964	307.876
50	2,500	125,000	7.0711	3.6840	.020000	7,853 982	314.159

Table 43.—*Squares, cubes, square roots, cube roots, reciprocals, and area and circumference of circles of radius N.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$	πN^2	$2\pi N$
51	2,601	132,651	7.1414	3.7084	.019607	8,171.283	320.442
52	2,704	140,608	7.2111	3.7325	.019231	8,494.867	326.726
53	2,809	148,877	7.2801	3.7563	.018868	8,824.734	333.009
54	2,916	157,464	7.3485	3.7798	.018519	9,160.884	339.292
55	3,025	166,375	7.4162	3.8030	.018182	9,503.318	345.575
56	3,136	175,616	7.4833	3.8259	.017857	9,852.035	351.858
57	3,249	185,193	7.5498	3.8485	.017544	10,207.035	358.142
58	3,364	195,112	7.6158	3.8709	.017241	10,568.318	364.425
59	3,481	205,379	7.6811	3.8930	.016949	10,935.884	370.708
60	3,600	216,000	7.7460	3.9149	.016667	11,309.734	376.991
61	3,721	226,981	7.8102	3.9365	.016393	11,689.866	383.274
62	3,844	238,328	7.8740	3.9579	.016129	12,076.282	389.557
63	3,969	250,047	7.9373	3.9791	.015873	12,468.981	395.841
64	4,096	262,144	8.0000	4.0000	.015625	12,867.964	402.124
65	4,225	274,625	8.0623	4.0207	.015385	13,273.229	408.407
66	4,356	287,496	8.1240	4.0412	.015156	13,684.778	414.690
67	4,489	300,763	8.1854	4.0615	.014925	14,102.610	420.973
68	4,624	314,432	8.2462	4.0817	.014706	14,526.725	427.257
69	4,761	328,509	8.3066	4.1016	.014493	14,957.123	433.540
70	4,900	343,000	8.3666	4.1213	.014286	15,393.804	439.823
71	5,041	357,911	8.4261	4.1408	.014085	15,836.769	446.106
72	5,184	373,248	8.4853	4.1602	.013889	16,286.017	452.389
73	5,329	389,017	8.5440	4.1793	.013699	16,741.547	458.673
74	5,476	405,224	8.6023	4.1983	.013514	17,203.362	464.956
75	5,625	421,875	8.6603	4.2172	.013333	17,671.459	471.239
76	5,776	438,976	8.7178	4.2358	.013158	18,145.839	477.522
77	5,929	456,533	8.7750	4.2543	.012987	18,626.503	483.805
78	6,084	474,552	8.8318	4.2727	.012821	19,113.450	490.088
79	6,241	493,039	8.8882	4.2908	.012658	19,606.680	496.372
80	6,400	512,000	8.9443	4.3089	.012500	20,106.193	502.655
81	6,561	531,441	9.0000	4.3267	.012346	20,611.990	508.938
82	6,724	551,368	9.0554	4.3445	.012195	21,124.069	515.221
83	6,889	571,787	9.1104	4.3621	.012048	21,642.432	521.504
84	7,056	592,704	9.1652	4.3795	.011905	22,167.078	527.788
85	7,225	614,125	9.2195	4.3968	.011765	22,698.007	534.071
86	7,396	636,056	9.2736	4.4140	.011628	23,235.220	540.354
87	7,569	658,503	9.3274	4.4310	.011494	23,778.715	546.637
88	7,744	681,472	9.3808	4.4180	.011364	24,328.494	552.920
89	7,921	704,969	9.4340	4.4647	.011236	24,884.556	559.205
90	8,100	729,000	9.4868	4.4814	.011111	25,446.901	565.487
91	8,281	753,571	9.5394	4.4979	.010989	26,015.529	571.770
92	8,464	778,688	9.5917	4.5144	.010870	26,590.441	578.053
93	8,649	804,357	9.6437	4.5307	.010753	27,171.635	584.336
94	8,836	830,584	9.6954	4.5468	.010638	27,759.113	590.619
95	9,025	857,375	9.7468	4.5629	.010526	28,352.874	596.903
96	9,216	884,736	9.7980	4.5789	.010417	28,952.918	603.186
97	9,409	912,673	9.8489	4.5947	.010309	29,559.246	609.469
98	9,604	941,192	9.8995	4.6104	.010204	30,171.856	615.752
99	9,801	970,299	9.9499	4.6261	.010101	30,790.750	622.035
100	10,000	1,000,000	10.0000	4.6416	.010000	31,415.927	628.319

Table 43.—*Squares, cubes, square roots, cube roots and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
101	10,201	1,030,301	10.0498756	4.6570095	.009900990
102	10,404	1,061,208	10.0995049	4.6728287	.009803922
103	10,609	1,092,727	10.1488916	4.6875482	.009708738
104	10,816	1,124,864	10.1980390	4.7026694	.009615385
105	11,025	1,157,625	10.2469508	4.7176940	.009523810
106	11,236	1,191,016	10.2956301	4.7326235	.009433962
107	11,449	1,225,043	10.3440804	4.7474594	.009345794
108	11,664	1,259,712	10.3923048	4.7622032	.009259259
109	11,881	1,295,029	10.4403065	4.7768562	.009174312
110	12,100	1,331,000	10.4880885	4.7914199	.009090909
111	12,321	1,367,631	10.5356538	4.8058955	.009009009
112	12,544	1,404,928	10.5830052	4.8202845	.008928571
113	12,769	1,442,897	10.6301458	4.8345881	.008849558
114	12,996	1,481,544	10.6770783	4.8488076	.008771930
115	13,225	1,520,875	10.7238053	4.8629442	.008695652
116	13,456	1,560,896	10.7703296	4.8769990	.008620690
117	13,689	1,601,613	10.8166538	4.8909732	.008547009
118	13,924	1,643,032	10.8627805	4.9048681	.008474576
119	14,161	1,685,159	10.9087121	4.9186847	.008403361
120	14,400	1,728,000	10.9544512	4.9324242	.008333333
121	14,641	1,771,561	11.0000000	4.9460874	.008264463
122	14,884	1,815,848	11.0453610	4.9596757	.008196721
123	15,129	1,860,867	11.0905365	4.9731898	.008130081
124	15,376	1,906,624	11.1355287	4.9866310	.008064516
125	15,625	1,953,125	11.1803399	5.0000000	.008000000
126	15,876	2,000,376	11.2249722	5.0132979	.007936508
127	16,129	2,048,383	11.2694277	5.0265257	.007874016
128	16,384	2,097,152	11.3137085	5.0396842	.007812500
129	16,641	2,146,689	11.3578167	5.0527743	.007751938
130	16,900	2,197,000	11.4017543	5.0657970	.007692308
131	17,161	2,248,091	11.4455231	5.0787531	.007633588
132	17,424	2,299,968	11.4891253	5.0916434	.007575758
133	17,689	2,352,637	11.5325626	5.1044687	.007518797
134	17,956	2,406,104	11.5758369	5.1172299	.007462687
135	18,225	2,460,375	11.6189500	5.1299278	.007407407
136	18,496	2,515,456	11.6619038	5.1425632	.007352941
137	18,769	2,571,353	11.7046999	5.1551367	.007299270
138	19,044	2,628,072	11.7473401	5.1676493	.007246377
139	19,321	2,685,619	11.7898261	5.1801015	.007194245
140	19,600	2,744,000	11.8321596	5.1924941	.007142857
141	19,881	2,803,221	11.8743421	5.2048279	.007092199
142	20,164	2,863,288	11.9163753	5.2171034	.007042254
143	20,449	2,924,207	11.9582607	5.2293215	.006993007
144	20,736	2,985,984	12.0000000	5.2414828	.006944444
145	21,025	3,048,625	12.0415946	5.2535879	.006896552
146	21,316	3,112,136	12.0830460	5.2656374	.006849315
147	21,609	3,176,523	12.1243557	5.2776321	.006802721
148	21,904	3,241,792	12.1655251	5.2895725	.006756757
149	22,201	3,307,949	12.2065556	5.3014592	.006711409
150	22,500	3,375,000	12.2474487	5.3132928	.006666667

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N.	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
151	22,801	3,442,951	12.2882057	5.3250740	.006622517
152	23,104	3,511,808	12.3288280	5.3368083	.006578947
153	23,409	3,581,577	12.3693169	5.3484812	.006535948
154	23,716	3,652,264	12.4096736	5.3601084	.006493506
155	24,025	3,723,875	12.4498996	5.3716854	.006451613
156	24,336	3,796,416	12.4899960	5.3832126	.006410256
157	24,649	3,869,893	12.5299641	5.3946907	.006369427
158	24,964	3,944,312	12.5698051	5.4061202	.006329114
159	25,281	4,019,679	12.6095202	5.4175015	.006289308
160	25,600	4,096,000	12.6491106	5.4288352	.006250000
161	25,921	4,173,281	12.6885775	5.4401218	.006211180
162	26,244	4,251,528	12.7279221	5.4513618	.006172840
163	26,569	4,330,747	12.7671453	5.4625556	.006134969
164	26,896	4,410,944	12.8062485	5.4737037	.006097561
165	27,225	4,492,125	12.8452326	5.4848066	.006060606
166	27,556	4,574,296	12.8840987	5.4958647	.006024096
167	27,889	4,657,463	12.9228480	5.5068784	.005988024
168	28,224	4,741,632	12.9614814	5.5178484	.005952381
169	28,561	4,826,809	13.0000000	5.5287748	.005917160
170	28,900	4,913,000	13.0384048	5.5396588	.005882353
171	29,241	5,000,211	13.0766968	5.5504991	.005847953
172	29,584	5,088,448	13.1148770	5.5612978	.005813953
173	29,929	5,177,717	13.1529464	5.5720546	.005780347
174	30,276	5,268,024	13.1909060	5.5827702	.005747126
175	30,625	5,359,375	13.2287566	5.5934447	.005714286
176	30,976	5,451,776	13.2664992	5.6040787	.005681818
177	31,329	5,545,233	13.3041347	5.6146724	.005649718
178	31,684	5,639,752	13.3416641	5.6252263	.005617978
179	32,041	5,735,339	13.3790882	5.6357408	.005586592
180	32,400	5,832,000	13.4164079	5.6462162	.005555556
181	32,761	5,929,741	13.4536240	5.6566528	.005524862
182	33,124	6,028,568	13.4907376	5.6670511	.005494505
183	33,489	6,128,487	13.5277493	5.6774114	.005464481
184	33,856	6,229,504	13.5646600	5.6877340	.005434783
185	34,225	6,331,625	13.6014705	5.6980192	.005405405
186	34,596	6,434,856	13.6381817	5.7082675	.005376344
187	34,969	6,539,203	13.6747943	5.7184791	.005347594
188	35,344	6,644,672	13.7113092	5.7286543	.005319149
189	35,721	6,751,269	13.7477271	5.7387936	.005291005
190	36,100	6,859,000	13.7840488	5.7488971	.005263158
191	36,481	6,967,871	13.8202750	5.7589652	.005235602
192	36,864	7,077,888	13.8564065	5.7689982	.005208333
193	37,249	7,189,057	13.8924440	5.7789966	.005181347
194	37,636	7,301,384	13.9283883	5.7889604	.005154639
195	38,025	7,414,875	13.9642400	5.7988900	.005128205
196	38,416	7,529,536	14.0000000	5.8087857	.005102041
197	38,809	7,645,373	14.0356688	5.8186479	.005076142
198	39,204	7,762,392	14.0712473	5.8284767	.005050505
199	39,610	7,880,599	14.1067360	5.8382725	.005025126
200	40,000	8,000,000	14.1421356	5.8480355	.005000000

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
201	40,401	8,120,601	14.1774469	5.8577660	.004975124
202	40,804	8,242,408	14.2126704	5.8674643	.004950495
203	41,209	8,365,427	14.2478068	5.8771307	.004926108
204	41,616	8,489,664	14.2828569	5.8867653	.004901961
205	42,025	8,615,125	14.3178211	5.8963685	.004878049
206	42,436	8,741,816	14.3527001	5.9059406	.004854369
207	42,849	8,869,743	14.3874946	5.9154817	.004830918
208	43,264	8,998,912	14.4222051	5.9249921	.004807692
209	43,681	9,129,329	14.4568323	5.9344721	.004784689
210	44,100	9,261,000	14.4913767	5.9439220	.004761905
211	44,521	9,393,931	14.5258390	5.9533418	.004739336
212	44,944	9,528,128	14.5602198	5.9627320	.004716981
213	45,369	9,663,597	14.5945195	5.9720926	.004694836
214	45,796	9,800,344	14.6287388	5.9814240	.004672897
215	46,225	9,938,375	14.6628783	5.9907264	.004651163
216	46,656	10,077,696	14.6969385	6.0000000	.004629630
217	47,089	10,218,313	14.7309199	6.0092450	.004608295
218	47,524	10,360,232	14.7648231	6.0184617	.004587156
219	47,961	10,503,459	14.7986486	6.0276502	.004566210
220	48,400	10,648,000	14.8323970	6.0368107	.004545455
221	48,841	10,793,861	14.8660687	6.0459435	.004524887
222	49,284	10,941,048	14.8996644	6.0550489	.004504505
223	49,729	11,089,567	14.9331845	6.0641270	.004484305
224	50,176	11,239,424	14.9666295	6.0731779	.004464286
225	50,625	11,390,625	15.0000000	6.0822020	.004444444
226	51,076	11,543,176	15.0332964	6.0911994	.004424779
227	51,529	11,697,083	15.0665192	6.1001702	.004405286
228	51,984	11,852,352	15.0996689	6.1091147	.004385965
229	52,441	12,008,989	15.1327460	6.1180332	.004366812
230	52,900	12,167,000	15.1657509	6.1269257	.004347826
231	53,361	12,326,391	15.1986842	6.1357924	.004329004
232	53,824	12,487,168	15.2315462	6.1446337	.004310345
233	54,289	12,649,337	15.2643375	6.1534495	.004291845
234	54,756	12,812,904	15.2970585	6.1622401	.004273504
235	55,225	12,977,875	15.3297097	6.1710058	.004255319
236	55,696	13,144,256	15.3622915	6.1797466	.004237288
237	56,169	13,312,053	15.3948043	6.1884628	.004219409
238	56,644	13,481,272	15.4272486	6.1971544	.004201681
239	57,121	13,651,919	15.4596248	6.2058218	.004184100
240	57,600	13,824,000	15.4919334	6.2144650	.004166667
241	58,081	13,997,521	15.5241747	6.2230843	.004149378
242	58,564	14,172,488	15.5563492	6.2316797	.004132231
243	59,049	14,348,907	15.5884573	6.2402515	.004115226
244	59,536	14,526,784	15.6204994	6.2487998	.004098361
245	60,025	14,706,125	15.6524758	6.2573248	.004081633
246	60,516	14,886,936	15.6843871	6.2658266	.004065041
247	61,009	15,069,223	15.7162336	6.2743054	.004048583
248	61,504	15,252,992	15.7480157	6.2827613	.004032258
249	62,001	15,438,249	15.7797338	6.2911946	.004016064
250	62,500	15,625,000	15.8113883	6.2996053	.004000000

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
251	63,001	15,813,251	15.8429795	6.3079985	.003984064
252	63,504	16,003,008	15.8745079	6.3163596	.003968254
253	64,009	16,194,277	15.9059737	6.3247035	.003952569
254	64,516	16,387,064	15.9373775	6.3330256	.003937008
255	65,025	16,581,375	15.9687194	6.3413257	.003921569
256	65,536	16,777,216	16.0000000	6.3496042	.003906250
257	66,049	16,974,593	16.0312195	6.3578611	.003891051
258	66,564	17,173,512	16.0623784	6.3660968	.003875969
259	67,081	17,373,979	16.0934769	6.3743111	.003861004
260	67,600	17,576,000	16.1245155	6.3825043	.003846154
261	68,121	17,779,581	16.1554944	6.3906765	.003831418
262	68,644	17,984,728	16.1864141	6.3988279	.003816794
263	69,169	18,191,447	16.2172747	6.4069585	.003802281
264	69,696	18,399,744	16.2480768	6.4150687	.003787879
265	70,225	18,609,625	16.2788206	6.4231583	.003773585
266	70,756	18,821,096	16.3095064	6.4312276	.003759398
267	71,289	19,034,163	16.3401346	6.4392767	.003745318
268	71,824	19,248,832	16.3707055	6.4473057	.003731343
269	72,361	19,465,109	16.4012195	6.4553148	.003717472
270	72,900	19,683,000	16.4316767	6.4633041	.003703704
271	73,441	19,902,511	16.4620776	6.4712736	.003690037
272	73,984	20,123,648	16.4924225	6.4792236	.003676471
273	74,529	20,346,417	16.5227116	6.4871541	.003663004
274	75,076	20,570,824	16.5529454	6.4950653	.003649635
275	75,625	20,796,875	16.5831240	6.5029572	.003636364
276	76,176	21,024,576	16.6132477	6.5108300	.003623188
277	76,729	21,253,933	16.6433170	6.5186839	.003610108
278	77,284	21,484,952	16.6733320	6.5265189	.003597122
279	77,841	21,717,639	16.7032931	6.5343351	.003584229
280	78,400	21,952,000	16.7332005	6.5421326	.003571429
281	78,961	22,188,041	16.7630546	6.5499116	.003558719
282	79,524	22,425,768	16.7928556	6.5576722	.003546099
283	80,089	22,665,187	16.8226038	6.5654144	.003533569
284	80,656	22,906,304	16.8522995	6.5731385	.003521127
285	81,225	23,149,125	16.8819430	6.5808443	.003508772
286	81,796	23,393,656	16.9115345	6.5885323	.003496508
287	82,369	23,639,903	16.9410743	6.5962023	.003484321
288	82,944	23,887,872	16.9705627	6.6038545	.003472222
289	83,521	24,137,569	17.0000000	6.6114890	.003460208
290	84,100	24,389,000	17.0293864	6.6191060	.003448276
291	84,681	24,642,171	17.0587221	6.6267054	.003436426
292	85,264	24,897,088	17.0880075	6.6342874	.003424658
293	85,849	25,153,757	17.1172428	6.6418522	.003412969
294	86,436	25,412,184	17.1464282	6.6493998	.003401361
295	87,025	25,672,375	17.1755640	6.6569302	.003389831
296	87,616	25,934,336	17.2016505	6.6644437	.003378378
297	88,209	26,198,073	17.2336879	6.6719403	.003367008
298	88,804	26,463,592	17.2626765	6.6794200	.003355705
299	89,401	26,730,899	17.2916165	6.6868831	.003344482
300	90,000	27,000,000	17.3205081	6.6943295	.003333333

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
301	90,601	27,270,901	17.3493516	6.7017598	.003322259
302	91,204	27,543,608	17.3781472	6.7091729	.003311258
303	91,809	27,818,127	17.4068952	6.7165700	.003309330
304	92,416	28,094,464	17.4355958	6.7239508	.003289474
305	93,025	28,372,625	17.4642492	6.7313155	.003278689
306	93,636	28,652,616	17.4928557	6.7386641	.003267974
307	94,249	28,934,443	17.5214155	6.7459967	.003257329
308	94,864	29,218,112	17.5499288	6.7533134	.003246753
309	95,481	29,503,629	17.5783958	6.7606143	.003236246
310	96,100	29,791,000	17.6068169	6.7678995	.003226806
311	96,721	30,080,231	17.6351921	6.7751690	.003215434
312	97,344	30,371,328	17.6635217	6.7824229	.003205128
313	97,969	30,664,297	17.6918060	6.7896613	.003194888
314	98,596	30,959,144	17.7200451	6.7968844	.003184713
315	99,225	31,255,875	17.7482393	6.8040921	.003174603
316	99,856	31,554,496	17.7763888	6.8112847	.003164557
317	100,489	31,855,013	17.8044938	6.8184620	.003154574
318	101,124	32,157,432	17.8325545	6.8256242	.003144654
319	101,761	32,461,759	17.8605711	6.8327714	.003134796
320	102,400	32,768,000	17.8885438	6.8399037	.003125000
321	103,041	33,076,161	17.9164729	6.8470213	.003115265
322	103,684	33,386,248	17.9443584	6.8541240	.003105590
323	104,329	33,698,267	17.9722008	6.8612120	.003095975
324	104,976	34,012,224	18.0000000	6.8682855	.003086420
325	105,625	34,328,125	18.0277564	6.8753443	.003076923
326	106,276	34,645,976	18.0554701	6.8823888	.003067485
327	106,929	34,965,783	18.0831413	6.8894188	.003058104
328	107,584	35,287,552	18.1107703	6.8964345	.003048780
329	108,241	35,611,289	18.1383571	6.9034359	.003039514
330	108,900	35,937,000	18.1659021	6.9104232	.003030303
331	109,561	36,264,691	18.1934054	6.9173964	.003021148
332	110,224	36,594,368	18.2208672	6.9243556	.003012048
333	110,889	36,926,037	18.2482876	6.9313008	.003003003
334	111,556	37,259,704	18.2756669	6.9382321	.002994012
335	112,225	37,595,375	18.3030052	6.9451496	.002985075
336	112,896	37,933,056	18.3303028	6.9520533	.002976190
337	113,569	38,272,753	18.3575598	6.9589434	.002967359
338	114,244	38,614,472	18.3847763	6.9658198	.002958580
339	114,921	38,958,219	18.4119526	6.9726826	.002949853
340	115,600	39,304,000	18.4390889	6.9795321	.002941176
341	116,281	39,651,821	18.4661853	6.9863681	.002932551
342	116,964	40,001,688	18.4932420	6.9931906	.002923977
343	117,649	40,353,607	18.5202592	7.0000000	.002915452
344	118,336	40,707,584	18.5472370	7.0067962	.002906977
345	119,025	41,063,625	18.5741756	7.0135791	.002898551
346	119,716	41,421,736	18.6010752	7.0203490	.002890173
347	120,409	41,781,923	18.6279360	7.0271058	.002881844
348	121,104	42,144,192	18.6547581	7.0338497	.002873563
349	121,801	42,508,549	18.6815417	7.0405806	.002865330
350	122,500	42,875,000	18.7082869	7.0472987	.002857143

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
351	123,201	43,243,551	18.7349940	7.0540041	.002849003
352	123,904	43,614,208	18.7616630	7.0606967	.002840909
353	124,609	43,986,977	18.7882942	7.0673767	.002832861
354	125,316	44,361,864	18.8148877	7.0740440	.002824859
355	126,025	44,738,875	18.8414437	7.0806988	.002816901
356	126,736	45,118,016	18.8679623	7.0873411	.002808989
357	127,449	45,499,293	18.8944436	7.0939709	.002801120
358	128,164	45,882,712	18.9208879	7.1005885	.002793296
359	128,881	46,268,279	18.9472953	7.1071937	.002785515
360	129,600	46,656,000	18.9736660	7.1137866	.002777778
361	130,321	47,045,881	19.0000000	7.1203674	.002770083
362	131,044	47,437,928	19.0262976	7.1269360	.002762431
363	131,769	47,832,147	19.0525589	7.1334925	.002754821
364	132,496	48,228,544	19.0787840	7.1400370	.002747253
365	133,225	48,627,125	19.1049732	7.1465695	.002739726
366	133,956	49,027,896	19.1311265	7.1530901	.002732240
367	134,689	49,430,863	19.1572441	7.1595988	.002724796
368	135,424	49,836,032	19.1833261	7.1660957	.002717391
369	136,161	50,243,409	19.2093727	7.1725809	.002710027
370	136,900	50,653,000	19.2353841	7.1790544	.002702703
371	137,641	51,064,811	19.2613603	7.1855162	.002695418
372	138,384	51,478,848	19.2873015	7.1919663	.002688172
373	139,129	51,895,117	19.3132079	7.1984050	.002680965
374	139,876	52,313,624	19.3390796	7.2048322	.002673797
375	140,625	52,734,375	19.3649167	7.2112479	.002666667
376	141,376	53,157,376	19.3907194	7.2176522	.002659574
377	142,129	53,582,633	19.4164878	7.2240450	.002652520
378	142,884	54,010,152	19.4422221	7.2304268	.002645503
379	143,641	54,439,939	19.4679223	7.2367972	.002638522
380	144,400	54,872,000	19.4935887	7.2431565	.002631579
381	145,161	55,306,841	19.5192213	7.2495045	.002624672
382	145,924	55,742,968	19.5448203	7.2558415	.002617801
383	146,689	56,181,887	19.5703858	7.2621675	.002610966
384	147,456	56,623,104	19.5959179	7.2684824	.002604167
385	148,225	57,066,625	19.6214169	7.2747864	.002597403
386	148,996	57,512,456	19.6468827	7.2810794	.002590674
387	149,769	57,960,603	19.6723156	7.2873617	.002583979
388	150,544	58,411,072	19.6977156	7.2936330	.002577320
389	151,321	58,863,869	19.7230829	7.2998936	.002570694
390	152,100	59,319,000	19.7484177	7.3061436	.002564103
391	152,881	59,776,471	19.7737199	7.3123828	.002557545
392	153,664	60,236,288	19.7989899	7.3186114	.002551020
393	154,449	60,698,457	19.8242276	7.3248295	.002544529
394	155,236	61,162,984	19.8494332	7.3310369	.002538071
395	156,025	61,629,875	19.8746069	7.3372339	.002531646
396	156,816	62,099,136	19.8997487	7.3434205	.002525253
397	157,609	62,570,773	19.9248588	7.3495966	.002518892
398	158,404	63,044,792	19.9499373	7.3557624	.002512563
399	159,201	63,521,199	19.9749844	7.3619178	.002506266
400	160,000	64,000,000	20.0000000	7.3680630	.002500000

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
401	160,801	64,481,201	20.0249844	7.3741979	.002493766
402	161,604	64,964,808	20.0499377	7.3808227	.002487562
403	162,409	65,450,827	20.0748599	7.3864373	.002481390
404	163,216	65,939,264	20.0997512	7.3925418	.002475248
405	164,025	66,430,125	20.1246118	7.3986363	.002469136
406	164,836	66,923,416	20.1494417	7.4047206	.002463054
407	165,649	67,419,143	20.1742410	7.4107950	.002457002
408	166,464	67,917,312	20.1990099	7.4168595	.002450980
409	167,281	68,417,929	20.2237484	7.4229142	.002444988
410	168,100	68,921,000	20.2484567	7.4289589	.002439024
411	168,921	69,426,531	20.2731349	7.4349938	.002433090
412	169,744	69,934,528	20.2977831	7.4410189	.002427184
413	170,569	70,444,997	20.3224014	7.4470342	.002421308
414	171,396	70,957,944	20.3469899	7.4530399	.002415459
415	172,225	71,473,375	20.3715488	7.4590359	.002409639
416	173,056	71,991,296	20.3960781	7.4650228	.002403846
417	173,889	72,511,713	20.4205779	7.4709991	.002398082
418	174,724	73,034,632	20.4450483	7.4769664	.002392344
419	175,561	73,560,059	20.4694895	7.4829242	.002386635
420	176,400	74,088,000	20.4939015	7.4888724	.002380952
421	177,241	74,618,461	20.5182845	7.4948113	.002375297
422	178,084	75,151,448	20.5426386	7.5007406	.002369668
423	178,929	75,686,967	20.5669638	7.5066607	.002364066
424	179,776	76,225,024	20.5912603	7.5125715	.002358491
425	180,625	76,765,625	20.6155281	7.5184730	.002352941
426	181,476	77,308,776	20.6397674	7.5243652	.002347418
427	182,329	77,854,483	20.6639783	7.5302482	.002341920
428	183,184	78,402,752	20.6881609	7.5361221	.002336449
429	184,041	78,953,589	20.7123152	7.5419867	.002331002
430	184,900	79,507,000	20.7364414	7.5478423	.002325581
431	185,761	80,062,991	20.7605395	7.5536888	.002320186
432	186,624	80,621,568	20.7846097	7.5595263	.002314815
433	187,489	81,182,737	20.8086520	7.5653548	.002309469
434	188,356	81,746,504	20.8326667	7.5711743	.002304147
435	189,225	82,312,875	20.8566536	7.5769849	.002298851
436	190,096	82,881,856	20.8806130	7.5827865	.002293578
437	190,969	83,453,453	20.9045450	7.5885793	.002288330
438	191,844	84,027,672	20.9284495	7.5943633	.002283105
439	192,721	84,604,519	20.9523268	7.6001385	.002277904
440	193,600	85,184,000	20.9761770	7.6059049	.002272727
441	194,481	85,766,121	21.0000000	7.6116626	.002267574
442	195,364	86,350,888	21.0237960	7.6174116	.002262443
443	196,249	86,938,307	21.0475652	7.6231519	.002257336
444	197,136	87,528,384	21.0713075	7.6288837	.002252252
445	198,025	88,121,125	21.0950231	7.6346067	.002247191
446	198,916	88,716,536	21.1187121	7.6403218	.002242152
447	199,809	89,314,623	21.1423745	7.6460272	.002237136
448	200,704	89,915,392	21.1660105	7.6517247	.002232143
449	201,601	90,518,849	21.1896201	7.6574133	.002227171
450	202,500	91,125,000	21.2132034	7.6630943	.002222222

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
451	203,401	91,738,851	21.2367606	7.6687665	.002217295
452	204,304	92,345,408	21.2602916	7.6744308	.002212389
453	205,209	92,959,677	21.2837967	7.6800857	.002207506
454	206,116	93,576,664	21.3072758	7.6857328	.002202643
455	207,025	94,196,375	21.3307290	7.6913717	.002197802
456	207,936	94,818,816	21.3541565	7.6970023	.002192982
457	208,849	95,443,993	21.3775583	7.7026246	.002188184
458	209,764	96,071,912	21.4009346	7.7082388	.002183406
459	210,681	96,702,579	21.4242853	7.7138448	.002178649
460	211,600	97,336,000	21.4476106	7.7194426	.002173913
461	212,521	97,972,181	21.4709106	7.7250325	.002169197
462	213,444	98,611,128	21.4941853	7.7306141	.002164502
463	214,369	99,252,847	21.5174348	7.7361877	.002159827
464	215,296	99,897,344	21.5406592	7.7417532	.002155172
465	216,225	100,544,625	21.5638587	7.7473109	.002150538
466	217,156	101,194,696	21.5870331	7.7528606	.002145923
467	218,089	101,847,563	21.6101828	7.7584023	.002141328
468	219,024	102,503,232	21.6333077	7.7639361	.002136752
469	219,961	103,161,709	21.6564078	7.7694620	.002132196
470	220,900	103,823,000	21.6794834	7.7749801	.002127660
471	221,841	104,487,111	21.7025344	7.7804904	.002123142
472	222,784	105,154,048	21.7255610	7.7859928	.002118644
473	223,729	105,823,817	21.7485632	7.7914875	.002114165
474	224,676	106,496,424	21.7715411	7.7969745	.002109705
475	225,625	107,171,875	21.7944947	7.8024538	.002105263
476	226,576	107,850,176	21.8174242	7.8079254	.002100840
477	227,529	108,531,333	21.8403297	7.8133892	.002096436
478	228,484	109,215,352	21.8632111	7.8188456	.002092050
479	229,441	109,902,239	21.8860686	7.8242942	.002087683
480	230,400	110,592,000	21.9089023	7.8297353	.002083333
481	231,361	111,284,641	21.9317122	7.8351688	.002079002
482	232,324	111,980,168	21.9544984	7.8405949	.002074689
483	233,289	112,678,587	21.9772610	7.8460134	.002070393
484	234,256	113,379,904	22.0000000	7.8514244	.002066116
485	235,225	114,084,125	22.0227155	7.8568281	.002061856
486	236,196	114,791,256	22.0454077	7.8622242	.002057613
487	237,169	115,501,303	22.0680765	7.8676130	.002053388
488	238,144	116,214,272	22.0907220	7.8729944	.002049180
489	239,121	116,930,169	22.1133444	7.8783684	.002044990
490	240,100	117,649,000	22.1359436	7.8837352	.002040816
491	241,081	118,370,771	22.1585198	7.8890946	.002036660
492	242,064	119,095,488	22.1810730	7.8944468	.002032520
493	243,049	119,823,157	22.2036033	7.8997917	.002028398
494	244,036	120,553,784	22.2261108	7.9051294	.002024291
495	245,025	121,287,375	22.2485955	7.9104599	.002020202
496	246,016	122,023,936	22.2710575	7.9157832	.002016129
497	247,009	122,763,473	22.2934968	7.9210994	.002012072
498	248,004	123,505,992	22.3159136	7.9264085	.002008032
499	249,001	124,251,499	22.3383079	7.9317104	.002004008
500	250,000	125,000,000	22.3606798	7.9370053	.002000000

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
501	251,001	125,751,501	22.3830293	7.9422961	.001996008
502	252,004	126,506,008	22.4058565	7.9475789	.001992032
503	253,009	127,263,527	22.4276615	7.9528477	.001988072
504	254,016	128,024,064	22.4499443	7.9581144	.001984127
505	255,025	128,787,625	22.4722051	7.9633743	.001980198
506	256,036	129,554,216	22.4944438	7.9686271	.001976285
507	257,049	130,323,843	22.5166605	7.9738731	.001972387
508	258,064	131,096,512	22.5388553	7.9791122	.001968504
509	259,081	131,872,229	22.5610283	7.9843444	.001964637
510	260,100	132,651,000	22.5831796	7.9895697	.001960784
511	261,121	133,432,831	22.6053091	7.9947883	.001956947
512	262,144	134,217,728	22.6274170	8.0000000	.001956125
513	263,169	135,005,697	22.6495033	8.0052049	.001949318
514	264,196	135,796,744	22.6715681	8.0104032	.001945525
515	265,225	136,590,875	22.6936114	8.0155946	.001941748
516	266,256	137,388,096	22.7156334	8.0207794	.001937984
517	267,289	138,188,413	22.7376340	8.0259574	.001934236
518	268,324	138,991,832	22.7596134	8.0311287	.001930502
519	269,361	139,798,359	22.7815715	8.0362935	.001926782
520	270,400	140,608,000	22.8035085	8.0414515	.001923077
521	271,441	141,420,761	22.8254244	8.0466030	.001919386
522	272,484	142,236,648	22.8473193	8.0517479	.001915709
523	273,529	143,055,667	22.8691933	8.0568862	.001912046
524	274,576	143,877,824	22.8910463	8.0620180	.001908397
525	275,625	144,703,125	22.9128785	8.0671432	.001904762
526	276,676	145,531,576	22.9346899	8.0722620	.001901141
527	277,729	146,363,183	22.9564806	8.0773743	.001897533
528	278,784	147,197,952	22.9782506	8.0824800	.001893939
529	279,841	148,035,889	23.0000000	8.0875794	.001890359
530	280,900	148,877,000	23.0217289	8.0926723	.001886792
531	281,961	149,721,291	23.0434372	8.0977589	.001883239
532	283,024	150,568,768	23.0651252	8.1028390	.001879699
533	284,089	151,419,437	23.0867928	8.1079128	.001876173
534	285,156	152,273,304	23.1084400	8.1129803	.001872659
535	286,225	153,130,375	23.1300670	8.1180414	.001869159
536	287,296	153,990,656	23.1516738	8.1230962	.001865672
537	288,369	154,854,153	23.1732605	8.1281447	.001862197
538	289,444	155,720,872	23.1948270	8.1331870	.001858736
539	290,521	156,590,819	23.2163735	8.1382230	.001855288
540	291,600	157,464,000	23.2379001	8.1432529	.001851852
541	292,681	158,340,421	23.2594067	8.1482765	.001848429
542	293,764	159,220,088	23.2808935	8.1532939	.001845018
543	294,849	160,103,007	23.3023604	8.1583051	.001841621
544	295,936	160,989,184	23.3238076	8.1633102	.001838235
545	297,025	161,878,625	23.3452351	8.1683092	.001834862
546	298,116	162,771,336	23.3666429	8.1733020	.001831502
547	299,209	163,667,323	23.3880311	8.1782888	.001828154
548	300,304	164,566,592	23.4093998	8.1832695	.001824818
549	301,401	165,469,149	23.4307490	8.1882441	.001821494
550	302,500	166,375,000	23.4520788	8.1932127	.001818182

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
551	303,601	167,284,151	23.4733892	8.1981753	.001814882
552	304,704	168,196,608	23.4946802	8.2081319	.001811594
553	305,809	169,112,377	23.5159520	8.2080825	.001808318
554	306,916	170,031,464	23.5372046	8.2130271	.001805054
555	308,025	170,953,875	23.5584380	8.2179657	.001801802
556	309,136	171,879,616	23.5796522	8.2228985	.001798561
557	310,249	172,808,693	23.6008474	8.2278254	.001795332
558	311,364	173,741,112	23.6220236	8.2327469	.001792115
559	312,481	174,676,879	23.6431808	8.2376614	.001788909
560	313,600	175,616,000	23.6643191	8.2425706	.001785714
561	314,721	176,558,481	23.6854386	8.2474740	.001782531
562	315,844	177,504,328	23.7065392	8.2523715	.001779359
563	316,969	178,453,547	23.7276210	8.2572633	.001776199
564	318,096	179,406,144	23.7486842	8.2621492	.001773050
565	319,225	180,362,125	23.7697286	8.2670294	.001769912
566	320,356	181,321,496	23.7907545	8.2719039	.001766784
567	321,489	182,284,263	23.8117618	8.2767726	.001763668
568	322,624	183,250,432	23.8327506	8.2816355	.001760563
569	323,761	184,220,009	23.8537209	8.2864928	.001757469
570	324,900	185,193,000	23.8746728	8.2913444	.001754386
571	326,041	186,169,411	23.8956063	8.2961903	.001751313
572	327,184	187,149,248	23.9165215	8.3010304	.001748252
573	328,329	188,132,517	23.9374184	8.3058651	.001745201
574	329,476	189,119,224	23.9582971	8.3106941	.001742160
575	330,625	190,109,375	23.9791576	8.3155175	.001739130
576	331,776	191,102,976	24.0000000	8.3203353	.001736111
577	332,929	192,100,033	24.0208243	8.3251475	.001733102
578	334,084	193,100,552	24.0416306	8.3299542	.001730104
579	335,241	194,104,539	24.0624188	8.3347553	.001727116
580	336,400	195,112,000	24.0831891	8.3395509	.001724138
581	337,561	196,122,941	24.1039416	8.3443410	.001721170
582	338,724	197,137,368	24.1246762	8.3491256	.001718213
583	339,889	198,155,287	24.1453929	8.3539047	.001715266
584	341,056	199,176,704	24.1660919	8.3586784	.001712329
585	342,225	200,201,625	24.1867732	8.3634466	.001709402
586	343,396	201,230,056	24.2074369	8.3682095	.001706485
587	344,569	202,262,003	24.2280829	8.3729668	.001703578
588	345,744	203,297,472	24.2487113	8.3777188	.001700680
589	346,921	204,336,469	24.2693222	8.3824653	.001697793
590	348,100	205,379,000	24.2899156	8.3872065	.001694915
591	349,281	206,425,071	24.3104916	8.3919423	.001692047
592	350,464	207,474,688	24.3310501	8.3966729	.001689189
593	351,649	208,527,857	24.3515913	8.4013981	.001686341
594	352,836	209,584,584	24.3721152	8.4061180	.001683502
595	354,025	210,644,875	24.3926218	8.4108326	.001680672
596	355,216	211,708,736	24.4131112	8.4155419	.001677852
597	356,409	212,776,173	24.4335834	8.4202460	.001675042
598	357,604	213,847,192	24.4540385	8.4249448	.001672241
599	358,801	214,921,799	24.4744765	8.4296383	.001669449
600	360,000	216,000,000	24.4948974	8.4343267	.001666667

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
601	361,201	217,081,801	24.5153013	8.4330998	.001663894
602	362,404	218,167,208	24.5355833	8.4436577	.001661130
603	363,609	219,256,227	24.5560583	8.4489605	.001658375
604	364,816	220,348,864	24.5766115	8.4590231	.001655629
605	366,025	221,445,125	24.5967478	8.4576906	.001652893
606	367,236	222,545,016	24.6170673	8.4629479	.001650165
607	368,449	223,648,543	24.6375700	8.4670001	.001647446
608	369,664	224,755,712	24.6576560	8.4716471	.001644737
609	370,881	225,866,529	24.6779254	8.4762892	.001642036
610	372,100	226,981,000	24.6981781	8.4809261	.001639344
611	373,321	228,099,131	24.7184142	8.4855579	.001636661
612	374,544	229,220,928	24.7386338	8.4901848	.001633987
613	375,769	230,346,397	24.7588368	8.4948065	.001631321
614	376,996	231,475,544	24.7790234	8.4994238	.001628664
615	378,225	232,608,375	24.7991935	8.5040350	.001626016
616	379,456	233,744,896	24.8193473	8.5086417	.001623377
617	380,689	234,885,113	24.8394847	8.5132435	.001620746
618	381,924	236,029,032	24.8596058	8.5178403	.001618123
619	383,161	237,176,659	24.8797106	8.5224321	.001615509
620	384,400	238,328,000	24.8997992	8.5270189	.001612903
621	385,641	239,483,061	24.9198716	8.5316009	.001610306
622	386,884	240,641,848	24.9399278	8.5361780	.001607717
623	388,129	241,804,367	24.9599679	8.5407501	.001605136
624	389,376	242,970,624	24.9799920	8.5453173	.001602564
625	390,625	244,140,625	25.0000000	8.5498797	.001600000
626	391,876	245,314,376	25.0199920	8.5544372	.001597444
627	393,129	246,491,883	25.0399681	8.5589899	.001594896
628	394,384	247,673,152	25.0599282	8.5635377	.001592357
629	395,641	248,858,189	25.0798724	8.5680807	.001589825
630	396,900	250,047,000	25.0998008	8.5726189	.001587302
631	398,161	251,239,591	25.1197134	8.5771523	.001584786
632	399,424	252,435,968	25.1396102	8.5816809	.001582278
633	400,689	253,636,137	25.1594913	8.5862047	.001579779
634	401,956	254,840,104	25.1793566	8.5907238	.001577287
635	403,225	256,047,875	25.1992063	8.5952380	.001574803
636	404,496	257,259,456	25.2190404	8.5997476	.001572327
637	405,769	258,474,853	25.2388589	8.6042525	.001569859
638	407,044	259,694,072	25.2586619	8.6087526	.001567398
639	408,321	260,917,119	25.2784498	8.6132480	.001564945
640	409,600	262,144,000	25.2982213	8.6177388	.001562500
641	410,881	263,374,721	25.3179778	8.6222248	.001560062
642	412,164	264,609,288	25.3377189	8.6267063	.001557632
643	413,449	265,847,707	25.3574447	8.6311830	.001555210
644	414,736	267,089,984	25.3771551	8.6356551	.001552795
645	416,025	268,336,125	25.3968502	8.6401226	.001550388
646	417,316	269,586,136	25.4165301	8.6445855	.001547988
647	418,609	270,840,023	25.4361947	8.6490437	.001545595
648	419,904	272,097,792	25.4558441	8.6534974	.001543210
649	421,201	273,359,449	25.4754784	8.6579465	.001540832
650	422,500	274,625,000	25.4950976	8.6623911	.001538462

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals.*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
651	423,801	275,894,451	25.5147016	8.6668310	.0015360983
652	425,104	277,167,808	25.5342907	8.6712665	.0015337423
653	426,409	278,445,077	25.5538647	8.6756974	.0015313894
654	427,716	279,726,264	25.5734237	8.6801237	.0015290652
655	429,025	281,011,375	25.5929678	8.6845456	.0015267176
656	430,336	282,300,416	25.6124969	8.6889630	.0015244390
657	431,649	283,593,393	25.6320112	8.6933759	.0015221070
658	432,964	284,890,312	25.6515107	8.6977843	.0015197757
659	434,281	286,191,179	25.6709953	8.7021882	.0015174451
660	435,600	287,496,000	25.6904652	8.7065877	.0015151152
661	436,921	288,804,781	25.7099203	8.7109827	.0015128859
662	438,244	290,117,528	25.7293607	8.7153734	.0015105574
663	439,569	291,434,247	25.7487864	8.7197596	.0015082296
664	440,896	292,754,944	25.7681975	8.7241414	.0015059024
665	442,225	294,079,625	25.7875939	8.7285187	.0015035759
666	443,556	295,408,296	25.8069758	8.7328918	.0015012502
667	444,889	296,740,963	25.8263431	8.7372604	.0014989250
668	446,224	298,077,632	25.8456960	8.7416246	.0014967006
669	447,561	299,418,309	25.8650343	8.7459846	.0014944768
670	448,900	300,763,000	25.8843582	8.7503401	.0014922537
671	450,241	302,111,711	25.9036677	8.7546913	.0014900313
672	451,584	303,464,448	25.9229628	8.7590383	.0014878095
673	452,929	304,821,217	25.9422435	8.7633809	.0014855884
674	454,276	306,182,024	25.9615100	8.7677192	.0014833680
675	455,625	307,546,875	25.9807621	8.7720532	.0014811481
676	456,976	308,915,776	26.0000000	8.7763830	.0014789289
677	458,329	310,288,733	26.0192237	8.7807084	.0014767105
678	459,684	311,665,752	26.0384331	8.7850296	.0014744926
679	461,041	313,046,839	26.0576284	8.7893466	.0014722754
680	462,400	314,432,000	26.0768096	8.7936596	.0014700588
681	463,761	315,821,241	26.0959767	8.7979679	.0014678429
682	465,124	317,214,568	26.1151297	8.8022721	.0014656276
683	466,489	318,611,987	26.1342687	8.8065722	.0014634129
684	467,856	320,013,504	26.1533937	8.8108681	.0014611988
685	469,225	321,419,125	26.1725047	8.8151596	.0014589854
686	470,596	322,828,856	26.1916017	8.8194474	.0014567726
687	471,969	324,242,703	26.2106848	8.8237307	.0014545604
688	473,344	325,660,672	26.2297541	8.8280099	.0014523488
689	474,721	327,082,769	26.2488095	8.8322850	.0014501379
690	476,100	328,509,000	26.2678511	8.8365559	.0014479275
691	477,481	329,939,371	26.2868789	8.8408227	.0014457178
692	478,864	331,373,888	26.3058929	8.8450854	.0014435087
693	480,249	332,812,557	26.3248932	8.8493440	.0014413001
694	481,636	334,255,384	26.3438797	8.8535985	.0014390922
695	483,025	335,702,375	26.3628527	8.8578489	.0014368849
696	484,416	337,153,536	26.3818119	8.8620952	.0014346782
697	485,809	338,608,873	26.4007576	8.8663375	.0014324720
698	487,204	340,068,392	26.4196896	8.8705757	.0014302665
699	488,601	341,532,099	26.4386081	8.8748099	.0014280615
700	490,000	343,000,000	26.4575131	8.8790400	.0014258571

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
701	491,401	344,472,101	26.4764046	8.8832861	.001426534
702	492,804	345,948,408	26.4952826	8.8874882	.001424501
703	494,209	347,428,927	26.5141472	8.8917063	.001422475
704	495,616	348,913,664	26.5329983	8.8959204	.001420455
705	497,025	350,402,625	26.5518361	8.9001304	.001418440
706	498,436	351,895,816	26.5706605	8.9043366	.001416431
707	499,849	353,393,243	26.5894716	8.9085387	.001414427
708	501,264	354,894,912	26.6082694	8.9127369	.001412429
709	502,681	356,400,829	26.6270539	8.9169311	.001410437
710	504,100	357,911,000	26.6458252	8.9211214	.001408451
711	505,521	359,425,431	26.6645833	8.9253078	.001406470
712	506,944	360,944,128	26.6833281	8.9294902	.001404494
713	508,369	362,467,097	26.7020598	8.9336687	.001402525
714	509,796	363,994,344	26.7207784	8.9378433	.001400560
715	511,225	365,525,875	26.7394839	8.9420140	.001398601
716	512,656	367,061,696	26.7581763	8.9461809	.001396648
717	514,089	368,601,813	26.7768557	8.9503438	.001394700
718	515,524	370,146,232	26.7955220	8.9545029	.001392758
719	516,961	371,694,959	26.8141754	8.9586581	.001390821
720	518,400	373,248,000	26.8328157	8.9628095	.001388889
721	519,841	374,805,361	26.8514432	8.9669570	.001386963
722	521,284	376,367,048	26.8700577	8.9711007	.001385042
723	522,729	377,933,067	26.8886593	8.9752406	.001383126
724	524,176	379,503,424	26.9072481	8.9793766	.001381215
725	525,625	381,078,125	26.9258240	8.9835089	.001379310
726	527,076	382,657,176	26.9443872	8.9876373	.001377410
727	528,529	384,240,583	26.9629375	8.9917620	.001375516
728	529,984	385,828,352	26.9814751	8.9958829	.001373626
729	531,441	387,420,489	27.0000000	9.0000000	.001371742
730	532,900	389,017,000	27.0185122	9.0041134	.001369863
731	534,361	390,617,891	27.0370117	9.0082229	.001367989
732	535,824	392,223,168	27.0554985	9.0123288	.001366120
733	537,289	393,832,837	27.0739727	9.0164309	.001364256
734	538,756	395,446,904	27.0924344	9.0205293	.001362398
735	540,225	397,065,375	27.1108834	9.0246239	.001360544
736	541,696	398,688,256	27.1293199	9.0287149	.001358696
737	543,169	400,315,553	27.1477439	9.0328021	.001356852
738	544,644	401,947,272	27.1661554	9.0368857	.001355014
739	546,121	403,583,419	27.1845544	9.0409655	.001353180
740	547,600	405,224,000	27.2029410	9.0450417	.001351351
741	549,081	406,869,021	27.2213152	9.0491142	.001349528
742	550,564	408,518,488	27.2396769	9.0531831	.001347709
743	552,049	410,172,407	27.2580263	9.0572484	.001345895
744	553,536	411,830,784	27.2763634	9.0613098	.001344086
745	555,025	413,493,625	27.2946881	9.0653677	.001342282
746	556,516	415,160,936	27.3130006	9.0694220	.001340483
747	558,009	416,832,723	27.3313007	9.0734726	.001338688
748	559,504	418,508,992	27.3495887	9.0775197	.001336898
749	561,001	420,189,749	27.3678644	9.0815631	.001335113
750	562,500	421,875,000	27.3861279	9.0856030	.001333333

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
751	564,001	423,564,751	27.4043792	9.0896392	.001331558
752	565,504	425,259,008	27.4226184	9.0936719	.001329787
753	567,009	426,957,777	27.4408455	9.0977010	.001328021
754	568,516	428,661,064	27.4590604	9.1017265	.001326260
755	570,025	430,368,875	27.4772633	9.1057485	.001324503
756	571,536	432,081,216	27.4954542	9.1097669	.001322751
757	573,049	433,798,093	27.5136330	9.1137818	.001321004
758	574,564	435,519,512	27.5317998	9.1177931	.001319261
759	576,081	437,245,479	27.5499546	9.1218010	.001317523
760	577,600	438,976,000	27.5680975	9.1258053	.001315789
761	579,121	440,711,081	27.5862284	9.1298061	.001314060
762	580,644	442,450,728	27.6043475	9.1338034	.001312336
763	582,169	444,194,947	27.6224546	9.1377971	.001310616
764	583,696	445,943,744	27.6405499	9.1417874	.001308901
765	585,225	447,697,125	27.6586334	9.1457742	.001307190
766	586,756	449,455,096	27.6767050	9.1497576	.001305483
767	588,289	451,217,663	27.6947648	9.1537375	.001303781
768	589,824	452,984,832	27.7128129	9.1577139	.001302083
769	591,361	454,756,609	27.7308492	9.1616869	.001300390
770	592,900	456,533,000	27.7488739	9.1656565	.001298701
771	594,441	458,314,011	27.7668868	9.1696225	.001297017
772	595,984	460,099,648	27.7848880	9.1735852	.001295337
773	597,529	461,889,917	27.8028775	9.1775445	.001293661
774	599,076	463,684,824	27.8208555	9.1815003	.001291990
775	600,625	465,484,375	27.8388218	9.1854527	.001290323
776	602,176	467,288,576	27.8567766	9.1894018	.001288660
777	603,729	469,097,433	27.8747197	9.1933474	.001287001
778	605,284	470,910,952	27.8926514	9.1972897	.001285347
779	606,841	472,729,139	27.9105715	9.2012286	.001283697
780	608,400	474,552,000	27.9284801	9.2051641	.001282051
781	609,961	476,379,541	27.9463772	9.2090962	.001280410
782	611,524	478,211,768	27.9642629	9.2130250	.001278772
783	613,089	480,048,687	27.9821372	9.2169505	.001277139
784	614,656	481,890,304	28.0000000	9.2208726	.001275510
785	616,225	483,736,625	28.0178515	9.2247914	.001273885
786	617,796	485,587,656	28.0356915	9.2287068	.001272265
787	619,369	487,443,403	28.0535203	9.2326189	.001270648
788	620,944	489,303,872	28.0713377	9.2365277	.001269036
789	622,521	491,169,069	28.0891438	9.2404333	.001267427
790	624,100	493,039,000	28.1069386	9.2443355	.001265823
791	625,681	494,913,671	28.1247222	9.2482344	.001264223
792	627,264	496,793,088	28.1424946	9.2521300	.001262626
793	628,849	498,677,257	28.1602557	9.2560224	.001261034
794	630,436	500,566,184	28.1780056	9.2599114	.001259446
795	632,025	502,459,875	28.1957444	9.2637973	.001257862
796	633,616	504,358,336	28.2134720	9.2676798	.001256281
797	635,209	506,261,573	28.2311884	9.2715592	.001254705
798	636,804	508,169,592	28.2488938	9.2754352	.001253133
799	638,401	510,082,399	28.2665881	9.2793081	.001251564
800	640,000	512,000,000	28.2842712	9.2831777	.001250000

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^3	N^2	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
801	641,601	513,922,401	28.3019434	9.2870440	.001248439
802	643,204	515,849,608	28.3196045	9.2909072	.001246883
803	644,809	517,781,627	28.3372546	9.2947671	.001245330
804	646,416	519,718,464	28.3548938	9.2986239	.001243781
805	648,025	521,660,125	28.3725219	9.3024775	.001242236
806	649,636	523,606,616	28.3901391	9.3063278	.001240695
807	651,249	525,557,943	28.4077454	9.3101750	.001239157
808	652,864	527,514,112	28.4253408	9.3140190	.001237624
809	654,481	529,475,129	28.4429253	9.3178599	.001236094
810	656,100	531,441,000	28.4604989	9.3216975	.001234568
811	657,721	533,411,731	28.4780617	9.3255320	.001233046
812	659,344	535,387,328	28.4956137	9.3293634	.001231527
813	660,969	537,367,797	28.5131549	9.3331916	.001230012
814	662,596	539,353,144	28.5306852	9.3370167	.001228501
815	664,225	541,343,375	28.5482048	9.3408386	.001226994
816	665,856	543,338,496	28.5657137	9.3446575	.001225490
817	667,489	545,338,513	28.5832119	9.3484731	.001223990
818	669,124	547,343,432	28.6006993	9.3522857	.001222494
819	670,761	549,353,259	28.6181760	9.3560952	.001221001
820	672,400	551,368,000	28.6356421	9.3599016	.001219512
821	674,041	553,387,661	28.6530976	9.3637049	.001218027
822	675,684	555,412,248	28.6705424	9.3675051	.001216545
823	677,329	557,441,767	28.6879766	9.3713022	.001215067
824	678,976	559,476,224	28.7054002	9.3750963	.001213592
825	680,625	561,515,625	28.7228132	9.3788878	.001212121
826	682,276	563,559,976	28.7402157	9.3826752	.001210654
827	683,929	565,609,283	28.7576077	9.3864600	.001209190
828	685,584	567,663,552	28.7749891	9.3902419	.001207729
829	687,241	569,722,789	28.7923601	9.3940206	.001206273
830	688,900	571,787,000	28.8097206	9.3977964	.001204819
831	690,561	573,856,191	28.8270706	9.4015691	.001203369
832	692,224	575,930,368	28.8444102	9.4053387	.001201923
833	693,889	578,009,537	28.8617394	9.4091054	.001200480
834	695,556	580,093,704	28.8790582	9.4128690	.001199041
835	697,225	582,182,875	28.8963666	9.4166297	.001197605
836	698,896	584,277,056	28.9136646	9.4203873	.001196172
837	700,569	586,376,253	28.9309523	9.4241420	.001194743
838	702,244	588,480,472	28.9482297	9.4278936	.001193317
839	703,921	590,589,719	28.9654967	9.4316423	.001191895
840	705,600	592,704,000	28.9827535	9.4353880	.001190476
841	707,281	594,823,321	29.0000000	9.4391307	.001189061
842	708,964	596,947,688	29.0172363	9.4428704	.001187648
843	710,649	599,077,107	29.0344623	9.4466072	.001186240
844	712,336	601,211,584	29.0516781	9.4503410	.001184834
845	714,025	603,351,125	29.0688837	9.4540719	.001183432
846	715,716	605,495,736	29.0860791	9.4577999	.001182033
847	717,409	607,645,423	29.1032644	9.4615249	.001180638
848	719,104	609,800,192	29.1204396	9.4652470	.001179245
849	720,801	611,960,049	29.1376046	9.4689661	.001177856
850	722,500	614,125,000	29.1547595	9.4726824	.001176471

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
851	724,201	616,295,051	29.1719043	9.4762957	.001175088
852	725,904	618,470,208	29.1890390	9.4801061	.001173709
853	727,609	620,650,477	29.2061637	9.4839136	.001172333
854	729,316	622,835,864	29.2232784	9.4877182	.001170960
855	731,025	625,026,375	29.2403830	9.4912200	.001169591
856	732,736	627,222,016	29.2574777	9.4949188	.001168224
857	734,449	629,422,793	29.2745623	9.4987147	.001166861
858	736,164	631,628,712	29.2916370	9.5025078	.001165501
859	737,881	633,839,779	29.3087018	9.5062980	.001164144
860	739,600	636,056,000	29.3257566	9.5096854	.001162791
861	741,321	638,277,381	29.3428015	9.5133699	.001161440
862	743,044	640,503,928	29.3598365	9.5170515	.001160093
863	744,769	642,735,647	29.3768616	9.5207303	.001158749
864	746,496	644,972,544	29.3938769	9.5244063	.001157407
865	748,225	647,214,625	29.4108823	9.5280794	.001156069
866	749,956	649,461,896	29.4278779	9.5317497	.001154734
867	751,689	651,714,363	29.4448637	9.5354172	.001153403
868	753,424	653,972,032	29.4618397	9.5390818	.001152074
869	755,161	656,234,909	29.4788059	9.5427437	.001150748
870	756,900	658,503,000	29.4957624	9.5464027	.001149425
871	758,641	660,776,311	29.5127091	9.5500589	.001148106
872	760,384	663,054,848	29.5296461	9.5537123	.001146789
873	762,129	665,338,617	29.5465734	9.5573630	.001145475
874	763,876	667,627,624	29.5634910	9.5610108	.001144165
875	765,625	669,921,875	29.5803989	9.5646559	.001142857
876	767,376	672,221,376	29.5972972	9.5682982	.001141553
877	769,129	674,526,133	29.6141858	9.5719377	.001140251
878	770,884	676,836,152	29.6310648	9.5755745	.001138952
879	772,641	679,151,439	29.6479342	9.5792085	.001137656
880	774,400	681,472,000	29.6647939	9.5828397	.001136364
881	776,161	683,797,841	29.6816442	9.5864682	.001135074
882	777,924	686,128,968	29.6984848	9.5900939	.001133787
883	779,689	688,465,387	29.7153159	9.5937169	.001132503
884	781,456	690,807,104	29.7321375	9.5973373	.001131222
885	783,225	693,154,125	29.7489496	9.6009548	.001129944
886	784,996	695,506,456	29.7657521	9.6045696	.001128668
887	786,769	697,864,103	29.7825452	9.6081817	.001127396
888	788,544	700,227,072	29.7993289	9.6117911	.001126126
889	790,321	702,595,369	29.8161030	9.6153977	.001124859
890	792,100	704,969,000	29.8328678	9.6190017	.001123596
891	793,881	707,347,971	29.8496231	9.6226030	.001122334
892	795,664	709,732,288	29.8663690	9.6262016	.001121076
893	797,449	712,121,957	29.8831056	9.6297975	.001119821
894	799,236	714,516,984	29.8998328	9.6333907	.001118568
895	801,025	716,917,375	29.9165506	9.6369812	.001117318
896	802,816	719,323,136	29.9332591	9.6405690	.001116071
897	804,609	721,734,273	29.9499583	9.6441542	.001114827
898	806,404	724,150,792	29.9666481	9.6477367	.001113586
899	808,201	726,572,699	29.9833287	9.6513166	.001112347
900	810,000	729,000,000	30.0000000	9.6548938	.001111111

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
901	811,801	731,432,701	30.0166620	9.6564684	.001109878
902	813,604	733,870,808	30.0333148	9.6620408	.001108647
903	815,409	736,314,327	30.0499584	9.6656096	.001107420
904	817,216	738,763,264	30.0665928	9.6691762	.001106195
905	819,025	741,217,625	30.0832179	9.6727408	.001104972
906	820,836	743,677,416	30.0998339	9.6763017	.001103758
907	822,649	746,142,643	30.1164407	9.6798604	.001102586
908	824,464	748,613,312	30.1330383	9.6834166	.001101822
909	826,281	751,089,429	30.1496269	9.6869701	.001100110
910	828,100	756,571,000	30.1662063	9.6905211	.001098901
911	829,921	756,058,031	30.1827765	9.6940694	.001097695
912	831,744	758,550,528	30.1993377	9.6976151	.001096491
913	833,569	761,048,497	30.2158899	9.7011583	.001095290
914	835,396	763,551,944	30.2324329	9.7046989	.001094092
915	837,225	766,060,875	30.2489669	9.7082369	.001092896
916	839,056	768,575,296	30.2654919	9.7117723	.001091703
917	840,889	771,095,213	30.2820079	9.7153051	.001090518
918	842,724	773,620,632	30.2985148	9.7188354	.001089325
919	844,561	776,151,559	30.3150128	9.7223631	.001088139
920	846,400	778,688,000	30.3315018	9.7258883	.001086957
921	848,241	781,229,961	30.3479818	9.7294109	.001085776
922	850,084	783,777,448	30.3644529	9.7329309	.001084599
923	851,929	786,330,467	30.3809151	9.7364484	.001083424
924	853,776	788,889,024	30.3973683	9.7399634	.001082251
925	855,625	791,453,125	30.4138127	9.7434758	.001081081
926	857,476	794,022,776	30.4302481	9.7469857	.001079914
927	859,329	796,597,983	30.4466747	9.7504930	.001078749
928	861,184	799,178,752	30.4630924	9.7539979	.001077586
929	863,041	801,765,089	30.4795013	9.7575002	.001076426
930	864,900	804,357,000	30.4959014	9.7610001	.001075269
931	866,761	806,954,491	30.5122926	9.7644974	.001074114
932	868,624	809,557,568	30.5286750	9.7679922	.001072961
933	870,489	812,166,237	30.5450487	9.7714845	.001071811
934	872,356	814,780,504	30.5614136	9.7749743	.001070664
935	874,225	817,400,375	30.5777697	9.7784616	.001069519
936	876,096	820,025,856	30.5941171	9.7819466	.001068376
937	877,969	822,656,953	30.6104557	9.7854288	.001067236
938	879,844	825,293,672	30.6267857	9.7889087	.001066098
939	881,721	827,936,019	30.6431069	9.7923861	.001064963
940	883,600	830,584,000	30.6594194	9.7958611	.001063830
941	885,481	833,237,621	30.6757233	9.7993336	.001062699
942	887,364	835,896,888	30.6920185	9.8028036	.001061571
943	889,249	838,561,807	30.7083051	9.8062711	.001060445
944	891,136	841,232,384	30.7245830	9.8097362	.001059322
945	893,025	843,908,625	30.7408523	9.8131989	.001058201
946	894,916	846,590,536	30.7571130	9.8166591	.001057082
947	896,809	849,278,123	30.7733651	9.8201169	.001055966
948	898,704	851,971,392	30.7896086	9.8235723	.001054852
949	900,601	854,670,349	30.8058436	9.8270252	.001053741
950	902,500	857,375,000	30.8220700	9.8304757	.001052632

Table 43.—*Squares, cubes, square roots, cube roots, and reciprocals*—Continued.

N	N^2	N^3	$N^{\frac{1}{2}}$	$N^{\frac{1}{3}}$	$\frac{1}{N}$
951	904,401	860,085,351	30.8382879	9.8339288	.001051525
952	906,304	862,801,408	30.8544972	9.8373695	.001050420
953	908,209	865,523,177	30.8706981	9.8408127	.001049318
954	910,116	868,250,664	30.8868904	9.8442586	.001048218
955	912,025	870,988,875	30.9030743	9.8476920	.001047120
956	913,936	873,722,816	30.9192497	9.8511280	.001046025
957	915,849	876,467,493	30.9354166	9.8545617	.001044932
958	917,764	879,217,912	30.9515751	9.8579929	.001043841
959	919,681	881,974,079	30.9677251	9.8614218	.001042753
960	921,600	884,736,000	30.9838668	9.8648483	.001041667
961	923,521	887,503,681	31.0000000	9.8682724	.001040583
962	925,444	890,277,128	31.0161248	9.8716941	.001039501
963	927,369	893,056,347	31.0322413	9.8751135	.001038422
964	929,296	895,841,344	31.0483494	9.8785305	.001037344
965	931,225	898,632,125	31.0644491	9.8819451	.001036269
966	933,156	901,428,696	31.0805405	9.8853574	.001035197
967	935,089	904,231,063	31.0966236	9.8887673	.001034126
968	937,024	907,039,232	31.1126984	9.8921749	.001033058
969	938,961	909,853,209	31.1287648	9.8955801	.001031992
970	940,900	912,673,000	31.1448230	9.8989830	.001030928
971	942,841	915,498,611	31.1608729	9.9023835	.001029866
972	944,784	918,330,048	31.1769145	9.9057817	.001028807
973	946,729	921,167,317	31.1929479	9.9091776	.001027749
974	948,676	924,010,424	31.2089731	9.9125712	.001026694
975	950,625	926,859,375	31.2249900	9.9159624	.001025641
976	952,576	929,714,176	31.2409987	9.9193513	.001024590
977	954,529	932,574,833	31.2569992	9.9227379	.001023541
978	956,484	935,441,352	31.2729915	9.9261222	.001022495
979	958,441	938,313,739	31.2889757	9.9295042	.001021450
980	960,400	941,192,000	31.3049517	9.9328839	.001020408
981	962,361	944,076,141	31.3209195	9.9362613	.001019368
982	964,324	946,966,168	31.3368792	9.9396363	.001018330
983	966,289	949,862,087	31.3528308	9.9430092	.001017294
984	968,256	952,763,904	31.3687743	9.9463797	.001016260
985	970,225	955,671,625	31.3847097	9.9497479	.001015228
986	972,196	958,585,256	31.4006369	9.9531138	.001014199
987	974,169	961,504,803	31.4165561	9.9564775	.001013171
988	976,144	964,430,272	31.4324673	9.9598389	.001012146
989	978,121	967,361,669	31.4483704	9.9631981	.001011122
990	980,100	970,299,000	31.4642654	9.9665549	.001010101
991	982,081	973,242,271	31.4801525	9.9699095	.001009082
992	984,064	976,191,488	31.4960315	9.9732619	.001008065
993	986,049	979,146,657	31.5119025	9.9766120	.001007049
994	988,036	982,107,784	31.5277655	9.9799599	.001006036
995	990,025	985,074,875	31.5436206	9.9833055	.001005025
996	992,016	988,047,936	31.5594677	9.9866488	.001004016
997	994,009	991,026,973	31.5753068	9.9899900	.001003009
998	996,004	994,011,992	31.5911380	9.9933289	.001002004
999	998,001	997,002,999	31.6069613	9.9966656	.001001001
1000	1,000,000	1,000,000,000	31.6227766	10.0000000	.001000000

Table 44.—*Difference of elevation in feet per mile for various angles of slope.*

Angle	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
′											
0	.....	92.2	184.4	276.7	369.2	461.9	555.0	648.3	742.1	836.3	931.0
1	1.5	93.7	185.9	278.3	370.8	463.5	556.5	649.9	743.6	837.8	932.6
2	3.1	95.2	187.5	279.8	372.3	465.0	558.1	651.4	745.2	839.4	934.2
3	4.6	96.8	189.0	281.3	373.8	466.6	559.6	653.0	746.8	841.0	935.8
4	6.1	98.3	190.5	282.9	375.4	468.1	561.2	654.5	748.3	842.6	937.4
5	7.7	99.8	192.1	284.4	376.9	469.7	562.7	656.1	749.9	844.2	938.9
6	9.2	101.4	193.6	286.0	378.5	471.2	564.3	657.7	751.5	845.7	940.5
7	10.8	102.9	195.1	287.5	380.0	472.8	565.8	659.2	753.0	847.3	942.1
8	12.3	104.4	196.7	289.0	381.6	474.3	567.4	660.8	754.6	848.9	943.7
9	13.8	106.0	198.2	290.6	383.1	475.9	568.9	662.4	746.2	850.5	945.3
10	15.4	107.5	199.8	292.1	384.7	477.4	570.5	663.9	757.7	852.0	946.9
11	16.9	109.1	201.3	293.7	386.2	479.0	572.0	665.5	759.3	853.6	948.5
12	18.4	110.6	202.8	295.2	387.7	480.5	573.6	667.0	760.9	855.2	950.0
13	20.0	112.1	204.4	296.7	389.3	482.1	575.2	668.6	762.4	856.8	951.6
14	21.5	113.7	205.9	298.3	390.8	483.6	576.7	670.2	764.0	858.3	953.2
15	23.0	115.2	207.5	299.8	392.4	485.2	578.3	671.7	765.6	859.9	954.8
16	24.6	116.7	209.0	301.4	393.9	486.7	579.8	673.3	767.1	861.5	956.4
17	26.1	118.3	210.5	302.9	395.5	488.3	581.4	674.8	768.7	863.1	958.0
18	27.6	119.8	212.1	304.4	397.0	489.8	582.9	676.4	770.3	864.7	959.6
19	29.2	121.4	213.6	306.0	398.6	491.3	584.5	678.0	771.8	866.2	961.1
20	30.7	122.9	215.1	307.5	400.1	492.9	586.0	679.5	773.4	867.8	962.7
21	32.3	124.4	216.7	309.1	401.6	494.5	587.6	681.1	775.0	869.4	964.3
22	33.8	126.0	218.2	310.6	403.2	496.0	589.1	682.6	776.6	871.0	965.9
23	35.3	127.5	219.8	312.1	404.7	497.6	590.7	684.2	778.1	872.5	967.5
24	36.9	129.0	221.3	313.7	406.3	499.1	592.2	685.8	779.7	864.1	969.1
25	38.4	130.6	222.8	315.2	407.8	500.7	593.8	687.3	781.3	875.7	970.7
26	39.9	132.1	224.4	316.8	409.4	502.2	595.4	688.9	782.8	877.3	972.2
27	41.5	133.6	225.9	318.3	410.9	503.8	596.9	690.5	784.4	878.8	973.8
28	43.0	135.2	227.5	319.9	412.5	505.3	598.5	692.0	786.0	880.4	975.4
29	44.5	136.7	229.0	321.4	414.0	506.9	600.0	693.6	787.5	882.0	977.0
30	46.1	138.3	230.5	322.9	415.5	508.4	601.6	695.1	789.1	883.6	978.6
31	47.6	139.8	232.1	324.5	417.1	510.0	603.1	696.7	790.7	885.2	980.2
32	49.2	141.3	233.6	326.0	418.6	511.5	604.7	698.3	792.2	886.7	981.8
33	50.7	142.9	235.1	327.6	420.2	513.0	606.3	699.8	793.8	888.3	983.4
34	52.2	144.4	236.7	329.1	421.7	514.6	607.8	701.4	795.4	889.9	985.0
35	53.8	146.0	238.2	330.6	423.3	516.2	609.4	702.9	796.9	891.5	986.5
36	55.3	147.5	239.8	332.2	424.8	517.7	610.9	704.5	798.5	893.1	988.1
37	56.8	149.0	241.3	333.7	426.4	519.3	612.5	706.1	800.1	894.6	989.7
38	58.4	150.6	242.8	335.3	427.9	520.8	614.0	707.6	801.7	896.2	991.3
39	59.9	152.1	244.4	336.8	429.5	522.4	615.5	709.2	803.2	897.8	992.9
40	61.4	153.6	245.9	338.4	431.0	523.9	617.2	710.8	804.8	899.4	944.5
41	63.0	155.2	247.5	339.9	432.5	525.5	618.7	712.3	806.4	901.0	996.1
42	64.5	156.7	249.0	341.4	434.1	527.0	620.3	713.9	808.0	902.5	997.7
43	66.0	158.2	250.5	343.0	435.6	528.6	621.8	715.5	809.5	904.1	999.3
44	67.6	159.8	252.1	344.5	437.2	530.1	623.4	717.0	811.1	905.7	1000.9

Table 44.—*Difference of elevation in feet per mile for various angles of slope*—Continued.

Angle	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
′											
45	69.1	161.3	253.6	346.1	438.7	531.7	624.9	718.6	812.7	907.3	1,002.5
46	70.6	162.9	255.2	347.6	440.3	533.2	626.5	720.2	814.2	908.9	1,004.0
47	72.2	164.4	256.7	349.2	441.8	534.8	628.0	721.7	815.8	910.5	1,005.6
48	73.7	165.9	258.2	350.7	443.4	536.3	629.6	723.3	817.4	912.0	1,007.2
49	75.3	167.5	259.8	352.2	444.9	537.9	631.2	724.8	819.0	913.6	1,008.8
50	76.8	169.0	261.3	353.8	446.5	539.4	632.7	726.4	820.5	915.2	1,010.4
51	78.3	170.6	262.9	355.3	448.0	541.0	634.3	728.0	822.1	916.8	1,012.0
52	79.9	172.1	264.4	356.9	449.6	542.5	635.8	729.5	823.7	918.4	1,013.6
53	81.4	173.6	265.9	358.4	451.1	544.1	637.4	731.1	825.3	919.9	1,015.2
54	82.9	175.2	267.5	360.0	452.7	545.6	638.9	732.7	826.8	921.5	1,016.8
55	84.5	176.7	269.0	361.5	454.2	547.2	640.5	734.2	828.4	923.1	1,018.4
56	86.0	178.2	270.6	363.0	455.8	548.7	642.1	735.8	830.0	924.7	1,020.0
57	87.5	179.8	272.1	364.6	457.3	550.3	643.6	737.4	831.5	926.3	1,021.5
58	89.1	181.3	273.6	366.1	458.8	551.8	645.2	738.9	833.1	927.8	1,023.1
59	90.6	182.8	275.2	367.7	460.4	553.4	646.7	740.5	834.7	929.4	1,024.7

Angle	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
′										
0	1,026.3	1,122	1,219	1,316	1,415	1,514	1,614	1,716	1,818	1,922
1	1,027.9	1,124	1,221	1,318	1,416	1,516	1,616	1,717	1,820	1,924
2	1,029.5	1,126	1,222	1,320	1,418	1,517	1,618	1,719	1,822	1,925
3	1,031.1	1,127	1,224	1,321	1,420	1,519	1,619	1,721	1,823	1,927
4	1,032.7	1,129	1,225	1,323	1,421	1,521	1,621	1,723	1,825	1,929
5	1,034.3	1,130	1,227	1,325	1,423	1,522	1,623	1,724	1,827	1,931
6	1,035.9	1,132	1,229	1,326	1,425	1,524	1,624	1,726	1,828	1,932
7	1,037.5	1,134	1,230	1,328	1,426	1,525	1,626	1,728	1,830	1,934
8	1,039.1	1,135	1,232	1,330	1,428	1,527	1,628	1,729	1,832	1,936
9	1,040.7	1,137	1,234	1,331	1,430	1,529	1,629	1,731	1,834	1,937
10	1,042.3	1,138	1,235	1,333	1,431	1,531	1,631	1,733	1,835	1,939
11	1,043.8	1,140	1,237	1,334	1,433	1,532	1,633	1,734	1,837	1,941
12	1,045.4	1,142	1,238	1,336	1,435	1,534	1,634	1,736	1,839	1,943
13	1,047.0	1,143	1,240	1,338	1,436	1,535	1,636	1,738	1,840	1,944
14	1,048.6	1,145	1,242	1,339	1,438	1,537	1,638	1,739	1,842	1,946

Table 44.—*Difference of elevation in feet per mile for various angles of slope*—Continued.

Angle	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°
′										
15	1,050.2	1,146	1,243	1,341	1,440	1,539	1,639	1,741	1,844	1,948
16	1,051.8	1,148	1,245	1,343	1,441	1,541	1,641	1,743	1,846	1,950
17	1,053.4	1,150	1,247	1,344	1,443	1,542	1,643	1,744	1,847	1,951
18	1,055.0	1,151	1,248	1,346	1,444	1,544	1,644	1,746	1,849	1,953
19	1,056.6	1,153	1,250	1,348	1,446	1,546	1,646	1,748	1,851	1,955
20	1,058.2	1,154	1,251	1,349	1,448	1,547	1,648	1,750	1,853	1,957
21	1,059.8	1,156	1,253	1,351	1,449	1,549	1,649	1,751	1,854	1,958
22	1,061.4	1,158	1,255	1,352	1,451	1,551	1,651	1,753	1,856	1,960
23	1,063.0	1,159	1,256	1,354	1,453	1,552	1,653	1,755	1,858	1,962
24	1,064.6	1,161	1,258	1,356	1,454	1,554	1,655	1,756	1,860	1,964
25	1,066.2	1,163	1,260	1,357	1,456	1,556	1,656	1,758	1,861	1,965
26	1,067.8	1,164	1,261	1,359	1,458	1,557	1,658	1,760	1,863	1,967
27	1,069.4	1,166	1,263	1,361	1,459	1,559	1,660	1,762	1,865	1,969
28	1,071.0	1,167	1,264	1,362	1,461	1,561	1,661	1,763	1,866	1,971
29	1,072.6	1,169	1,266	1,364	1,463	1,562	1,663	1,765	1,868	1,972
30	1,074.2	1,171	1,268	1,366	1,464	1,564	1,665	1,767	1,870	1,974
31	1,075.8	1,172	1,269	1,367	1,466	1,566	1,666	1,768	1,871	1,976
32	1,077.4	1,174	1,271	1,369	1,468	1,567	1,668	1,770	1,873	1,978
33	1,079.0	1,175	1,273	1,370	1,469	1,569	1,670	1,772	1,875	1,979
34	1,080.6	1,177	1,274	1,372	1,471	1,571	1,672	1,773	1,877	1,981
35	1,082.2	1,179	1,276	1,374	1,473	1,572	1,673	1,775	1,878	1,983
36	1,083.8	1,180	1,277	1,375	1,474	1,574	1,675	1,777	1,880	1,985
37	1,085.4	1,182	1,279	1,377	1,476	1,576	1,677	1,779	1,882	1,986
38	1,087.0	1,183	1,281	1,379	1,478	1,577	1,678	1,780	1,884	1,988
39	1,088.6	1,185	1,282	1,380	1,479	1,579	1,680	1,782	1,885	1,990
40	1,090.2	1,187	1,284	1,382	1,481	1,581	1,682	1,784	1,887	1,992
41	1,091.8	1,188	1,286	1,384	1,483	1,582	1,683	1,786	1,889	1,993
42	1,093.4	1,190	1,287	1,385	1,484	1,584	1,685	1,787	1,891	1,995
43	1,095.0	1,192	1,289	1,387	1,486	1,586	1,687	1,789	1,892	1,997
44	1,096.6	1,193	1,290	1,388	1,487	1,587	1,688	1,791	1,894	1,999
45	1,098.2	1,195	1,292	1,390	1,489	1,589	1,690	1,792	1,896	2,000
46	1,099.8	1,196	1,294	1,392	1,491	1,591	1,692	1,794	1,898	2,002
47	1,101.5	1,198	1,295	1,393	1,492	1,592	1,694	1,796	1,899	2,004
48	1,103.1	1,200	1,297	1,395	1,494	1,594	1,695	1,798	1,901	2,006
49	1,104.7	1,201	1,299	1,397	1,496	1,596	1,697	1,799	1,903	2,007
50	1,106.3	1,203	1,300	1,398	1,497	1,597	1,699	1,801	1,904	2,009
51	1,107.9	1,204	1,302	1,400	1,499	1,599	1,700	1,803	1,906	2,011
52	1,109.5	1,206	1,303	1,402	1,501	1,601	1,702	1,804	1,908	2,013
53	1,111.1	1,208	1,305	1,403	1,502	1,602	1,704	1,806	1,910	2,014
54	1,112.7	1,209	1,307	1,405	1,504	1,604	1,705	1,808	1,911	2,016
55	1,114.3	1,211	1,308	1,407	1,506	1,606	1,707	1,809	1,913	2,018
56	1,115.9	1,213	1,310	1,408	1,507	1,607	1,709	1,811	1,915	2,020
57	1,117.5	1,214	1,312	1,410	1,509	1,609	1,711	1,813	1,917	2,021
58	1,119.1	1,216	1,313	1,411	1,511	1,611	1,712	1,815	1,918	2,023
59	1,120.7	1,217	1,315	1,413	1,512	1,612	1,714	1,816	1,920	2,025

Table 45.—*Correction in feet for curvature and refraction.*

[$h = 0.574D^2$]

Distance in miles	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	.6	.7	.8	1.0	1.1	1.3	1.5	1.7	1.9	2.1
2	2.3	2.5	2.8	3.0	3.3	3.6	3.9	4.2	4.5	4.8
3	5.2	5.5	5.9	6.2	6.6	7.0	7.4	7.8	8.3	8.7
4	9.2	9.6	10.1	10.6	11.1	11.6	12.1	12.7	13.2	13.8
5	14.3	14.9	15.5	16.1	16.7	17.3	18.0	18.6	19.3	20.0
6	20.7	21.4	22.1	22.8	23.5	24.2	25.0	25.7	26.5	27.3
7	28.1	28.9	29.8	30.6	31.4	32.3	33.2	34.1	35.0	35.9
8	36.7	37.6	38.6	39.5	40.4	41.4	42.4	43.4	44.4	45.5
9	46.5	47.5	48.6	49.7	50.7	51.8	52.9	54.0	55.1	56.3
10	57.4	58.6	59.7	60.9	62.1	63.3	64.5	65.7	67.0	68.2
11	69.5	70.7	71.9	73.2	74.5	75.8	77.1	78.5	79.8	81.2
12	82.7	84.0	85.4	86.8	88.3	89.7	91.1	92.6	94.0	95.5
13	97.0	98.5	100.0	101.5	103.1	104.6	106.2	107.7	109.3	110.9
14	112.5	114.1	115.7	117.4	119.0	120.7	122.4	124.0	125.7	127.4
15	129.1	130.9	132.6	134.3	136.1	137.9	139.7	141.5	143.3	145.1
16	146.9	148.7	150.6	152.5	154.4	156.3	158.2	160.1	162.0	163.9
17	165.8	167.8	169.8	171.7	173.7	175.7	177.7	179.7	181.8	183.8
18	185.9	188.0	190.1	192.2	194.3	196.4	198.5	200.7	202.8	205.0
19	207.1	209.3	211.5	213.7	216.0	218.2	220.4	222.7	224.9	227.2
20	229.5	231.8	234.2	236.5	238.8	241.2	243.5	245.9	248.3	250.7
21	253.1	255.5	257.9	260.4	262.8	265.3	267.7	270.2	272.7	275.2
22	277.7	280.3	282.8	285.4	288.0	290.5	293.1	295.7	298.3	301.0
23	303.6	306.2	308.9	311.5	314.2	316.9	319.6	322.3	325.0	327.8
24	330.5	333.3	336.1	338.9	341.7	344.5	347.3	350.1	352.9	355.8
25	358.6	361.5	364.4	367.3	370.2	373.1	376.0	379.0	381.9	384.9
26	387.9	390.9	393.9	396.9	400.0	403.0	406.0	409.1	412.2	415.3
27	418.3	421.4	424.5	427.7	430.8	434.0	437.1	440.3	443.5	446.7
28	449.9	453.1	456.3	459.6	462.8	466.1	469.4	472.7	476.0	479.3
29	482.6	485.9	489.3	492.6	496.0	499.4	502.8	506.2	509.6	513.0
30	516.5	519.9	523.4	526.8	530.3	533.8	537.3	540.8	544.4	547.9
31	551.5	555.0	558.6	562.2	565.8	569.4	573.0	576.7	580.3	584.0
32	587.6	591.3	595.0	598.7	602.4	606.1	609.9	613.6	617.3	621.1
33	624.9	628.7	632.5	636.3	640.2	644.0	647.9	651.7	655.6	659.5
34	663.4	667.3	671.2	675.1	679.1	683.0	687.0	690.9	694.9	698.9
35	702.9	707.0	711.0	715.1	719.1	723.2	727.3	731.4	735.5	739.6
36	743.7	747.8	752.0	756.1	760.3	764.5	768.7	772.9	777.1	781.3
37	785.6	789.8	794.1	798.4	802.6	806.9	811.3	815.6	819.9	824.2
38	828.6	833.0	837.4	841.8	846.2	850.6	855.0	859.4	863.9	868.3
39	872.8	877.3	881.8	886.3	890.8	895.3	899.9	904.4	909.0	913.5
40	918.1	922.7	927.3	931.9	936.6	941.2	945.9	950.5	955.2	959.9

Table 46.—*Stadia Table.*

Slant distance		100	200	300	400	500	600	700	800	900
0°	2′	0.06	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5
	4	0.12	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0
	6	0.17	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6
	8	0.23	0.5	0.7	0.9	1.2	1.4	1.6	1.9	2.1
	10	0.29	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.6
	12	0.35	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1
	14	0.41	0.8	1.2	1.6	2.0	2.4	2.8	3.3	3.7
	16	0.47	0.9	1.4	1.9	2.3	2.8	3.3	3.7	4.2
	18	0.52	1.0	1.6	2.1	2.6	3.1	3.7	4.2	4.7
	20	0.58	1.2	1.7	2.3	2.9	3.5	4.1	4.6	5.2
	22	0.64	1.3	1.9	2.6	3.2	3.8	4.5	5.1	5.8
	24	0.70	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
	26	0.76	1.5	2.3	3.0	3.8	4.5	5.3	6.0	6.8
	28	0.81	1.6	2.4	3.2	4.1	4.9	5.7	6.5	7.3
	30	0.87	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.8
	32	0.93	1.9	2.8	3.7	4.6	5.6	6.5	7.4	8.4
	34	0.09	2.0	3.0	3.9	4.9	5.9	6.9	7.9	8.9
	36	1.05	2.1	3.1	4.2	5.2	6.3	7.3	8.4	9.4
	38	1.11	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9
	40	1.16	2.3	3.5	4.6	5.8	7·0	8.1	9.3	10.5
	42	1.22	2.4	3.7	4.9	6.1	7.3	8.5	9.8	11.0
	44	1.28	2.6	3.8	5.1	6.4	7.7	9.0	10.2	11.5
	46	1.34	2.7	4.0	5.3	6.7	8.0	9.4	10.7	12.0
	48	1.40	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5
	50	1.45	2.9	4.4	5.8	7.2	8.7	10.2	11.6	13.1
	52	1.51	3.0	4.5	6.0	7.5	9.1	10.6	12.1	13.6
	54	1.57	3.1	4.7	6.3	7.8	9.4	11.0	12.6	14.1
	56	1.63	3.3	4.9	6.5	8.1	9.8	11.4	13.0	14.6
	58	1.69	3.4	5.0	6.7	8.4	10.1	11.8	13.5	15.2
	60	1.74	3.5	5.2	7.0	8.7	10.5	12.2	14.0	15.7
1°	2′	1.80	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2
	4	1.86	3.7	5.6	7.4	9.3	11.2	13.0	14.9	16.7
	6	1.92	3.8	5.8	7.7	9.6	11.5	13.4	15.4	17.3
	8	1.98	4.0	5.9	7.9	9.9	11.9	13.8	15.8	17.8
	10	2.03	4.1	6.1	8.1	10.2	12.2	14.2	16.3	18.3
	12	2.09	4.2	6.3	8.4	10.5	12.6	14.7	16.7	18.8
	14	2.15	4.3	6.5	8.6	10.8	12.9	15.1	17.2	19.4
	16	2.21	4.4	6.6	8.8	11.0	13.3	15.5	17.7	19.9
	18	2.27	4.5	6.8	9.1	11.3	13.6	15.9	18.1	20.4
	20	2.33	4.7	7.0	9.3	11.6	14.0	16.3	18.6	20.9
	22	2.38	4.8	7.2	9.5	11.9	14.3	16.7	19.1	21.5
	24	2.44	4.9	7.3	9.8	12.2	14.7	17.1	19.5	22.0
	26	2.50	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5
	28	2.56	5.1	7.7	10.2	12.8	15.3	17.9	20.5	23.0
	30	2.62	5.2	7.8	10.5	13.1	15.7	18.3	20.9	23.5
	32	2.67	5.3	8.0	10.7	13.4	16.0	18.7	21.4	24.1
	34	2.73	5.5	8.2	10.9	13.7	16.4	19.1	21.9	24.6
	36	2.79	5.6	8.4	11.2	14.0	16.7	19.5	22.3	25.1
	38	2.85	5.7	8.5	11.4	14.2	17.1	19.9	22.8	25.6
	40	2.91	5.8	8.7	11.6	14.5	17.4	20.3	23.3	26.2
	42	2.97	5.9	8.9	11.9	14.8	17.8	20.8	23.7	26.7
	44	3.02	6.0	9.1	12.1	15.1	18.1	21.2	24.2	27.2
	46	3.08	6.2	9.2	12.3	15.4	18.5	21.6	24.6	27.7
	48	3.14	6.3	9.4	12.6	15.7	18.8	22.0	25.1	28.3
	50	3.20	6.4	9.6	12.8	16.0	19.2	22.4	25.6	28.8
	52	3.26	6.5	9.8	13.0	16.3	19.5	22.8	26.0	29.3
	54	3.31	6.6	9.9	13.2	16.6	19.9	23.2	26.5	29.8
	56	3.37	6.7	10.1	13.5	16.9	20.2	23.6	27.0	30.3
	58	3.43	6.9	10.3	13.7	17.1	20.6	24.0	27.4	30.9
	60	3.49	7.0	10.5	14.0	17.4	20.9	24.4	27.9	31.4
Horizontal distance		*99.9*	*199.8*	*299.6*	*399.5*	*499.4*	*599.3*	*699.2*	*799.0*	*898.9*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
2°	2′	3.55	7.1	10.6	14.2	17.7	21.3	24.8	28.4	31.9
	4	3.60	7.2	10.8	14.4	18.0	21.6	25.2	28.8	32.4
	6	3.66	7.3	11.0	14.6	18.3	22.0	25.6	29.3	33.0
	8	3.72	7.4	11.2	14.9	18.5	22.3	26.0	29.8	33.5
	10	3.78	7.6	11.3	15.1	18.9	22.7	26.4	30.2	34.0
	12	3.84	7.7	11.5	15.3	19.2	23.0	26.9	30.7	34.5
	14	3.90	7.8	11.7	15.6	19.5	23.4	27.3	31.2	35.1
	16	3.95	7.9	11.9	15.8	19.8	23.7	27.7	31.6	35.6
	18	4.01	8.0	12.0	16.0	20.0	24.1	28.1	32.1	36.1
	20	4.07	8.1	12.2	16.3	20.3	24.4	28.5	32.5	36.6
	22	4.13	8.3	12.4	16.5	20.6	24.8	28.9	33.0	37.1
	24	4.18	8.4	12.6	16.7	20.9	25.1	29.3	33.5	37.7
	26	4.24	8.5	12.7	17.0	21.2	25.5	29.7	33.9	38.2
	28	4.30	8.6	12.9	17.2	21.5	25.8	30.1	34.4	38.7
	30	4.36	8.7	13.1	17.4	21.8	26.1	30.5	34.9	39.2
	32	4.42	8.8	13.2	17.7	22.1	26.5	30.9	35.3	39.7
	34	4.47	8.9	13.4	17.9	22.4	26.8	31.3	35.8	40.3
	36	4.53	9.1	13.6	18.1	22.7	27.2	31.7	36.3	40.8
	38	4.59	9.2	13.8	18.4	23.0	27.5	32.1	36.7	41.3
	40	4.65	9.3	13.9	18.6	23.2	27.9	32.5	37.2	41.8
	42	4.71	9.4	14.1	18.8	23.5	28.2	32.9	37.6	42.4
	44	4.76	9.5	14.3	19.1	23.8	28.6	33.3	38.1	42.9
	46	4.82	9.6	14.5	19.3	24.1	28.9	33.8	38.6	43.4
	48	4.88	9.8	14.6	19.5	24.4	29.3	34.2	39.0	43.9
	50	4.94	9.9	14.8	19.8	24.7	29.6	34.6	39.5	44.4
	52	5.00	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0
	54	5.05	10.1	15.2	20.2	25.3	30.3	35.4	40.4	45.5
	56	5.11	10.2	15.3	20.4	25.6	30.7	35.8	40.9	46.0
	58	5.17	10.3	15.5	20.7	25.8	31.0	36.2	41.4	46.5
	60	5.23	10.5	15.7	20.9	26.1	31.4	36.6	41.8	47.1
Horizontal dist.		*99.7*	*199.5*	*299.2*	*398.9*	*498.7*	*598.4*	*698.1*	*797.8*	*897.5*
3°	2′	5.28	10.6	15.9	21.1	26.4	31.7	37.0	42.3	47.6
	4	5.34	10.7	16.0	21.4	26.7	32.1	37.4	42.7	48.1
	6	5.40	10.8	16.2	21.6	27.0	32.4	37.8	43.2	48.6
	8	5.46	10.9	16.4	21.8	27.3	32.7	38.2	43.7	49.1
	10	5.52	11.0	16.5	22.1	27.6	33.1	38.6	44.1	49.6
	12	5.57	11.1	16.7	22.3	27.9	33.4	39.0	44.6	50.2
	14	5.63	11.3	16.9	22.5	28.2	33.8	39.4	45.0	50.7
	16	5.69	11.4	17.1	22.8	28.4	34.1	39.8	45.5	51.2
	18	5.75	11.5	17.2	23.0	28.7	34.5	40.2	46.0	51.7
	20	5.80	11.6	17.4	23.2	29.0	34.8	40.6	46.4	52.2
	22	5.86	11.7	17.6	23.4	29.3	35.1	41.0	46.9	52.8
	24	5.92	11.8	17.8	23.7	29.6	35.5	41.4	47.4	53.3
	26	5.98	12.0	17.9	23.9	29.9	35.9	41.8	47.8	53.8
	28	6.04	12.1	18.1	24.1	30.2	36.2	42.2	48.3	54.3
	30	6.09	12.2	18.3	24.4	30.5	36.6	42.6	48.7	54.8
	32	6.15	12.3	18.4	24.6	30.8	36.9	43.0	49.2	55.4
	34	6.21	12.4	18.6	24.8	31.0	37.3	43.5	49.7	55.9
	36	6.27	12.5	18.8	25.1	31.3	37.6	43.9	50.1	56.4
	38	6.32	12.6	19.0	25.3	31.6	37.9	44.3	50.6	56.9
	40	6.38	12.8	19.1	25.5	31.9	38.3	44.7	51.1	57.4
	42	6.44	12.9	19.3	25.8	32.2	38.6	45.1	51.5	58.0
	44	6.50	13.0	19.5	26.0	32.5	39.0	45.5	52.0	58.5
	46	6.55	13.1	19.7	26.2	32.8	39.3	45.9	52.4	59.0
	48	6.61	13.2	19.8	26.4	33.1	39.7	46.3	52.9	59.5
	50	6.67	13.3	20.0	26.7	33.4	40.0	46.7	53.4	60.0
	52	6.73	13.5	20.2	26.9	33.6	40.4	47.1	53.8	60.6
	54	6.78	13.6	20.4	27.1	33.9	40.7	47.5	54.3	61.1
	56	6.84	13.7	20.5	27.4	34.2	41.1	47.9	54.7	61.6
	58	6.90	13.8	20.7	27.6	34.5	41.4	48.3	55.2	62.1
	60	6.96	13.9	20.9	27.8	34.8	41.7	48.7	55.7	62.6
Horizontal dist.		*99.5*	*199.0*	*298.5*	*398.0*	*497.6*	*597.1*	*696.6*	*796.1*	*895.6*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
4°	2′	7.02	14.0	21.0	28.1	35.1	42.1	49.1	56.1	63.1
	4	7.07	14.1	21.2	28.3	35.4	42.4	49.5	56.6	63.7
	6	7.13	14.3	21.4	28.5	35.7	42.8	49.9	57.0	64.2
	8	7.19	14.4	21.6	28.8	35.9	43.1	50.3	57.5	64.7
	10	7.25	14.5	21.7	29.0	36.2	43.5	50.7	58.0	65.2
	12	7.30	14.6	21.9	29.2	36.5	43.8	51.1	58.4	65.7
	14	7.36	14.7	22.1	29.4	36.8	44.2	51.5	58.9	66.2
	16	7.42	14.8	22.3	29.7	37.1	44.5	51.9	59.3	66.8
	18	7.48	15.0	22.4	29.9	37.4	44.9	52.3	59.8	67.3
	20	7.53	15.1	22.6	30.2	37.7	45.2	52.7	60.3	67.8
	22	7.59	15.2	22.8	30.4	38.0	45.5	53.1	60.7	68.3
	24	7.65	15.3	22.9	30.6	38.2	45.9	53.5	61.2	68.8
	26	7.71	15.4	23.1	30.8	38.5	46.2	53.9	61.6	69.3
	28	7.76	15.5	23.3	31.1	38.8	46.6	54.3	62.1	69.9
	30	7.82	15.6	23.5	31.3	39.1	46.9	54.7	62.6	70.4
	32	7.88	15.8	23.6	31.5	39.4	47.3	55.1	63.0	70.9
	34	7.94	15.9	23.8	31.7	39.7	47.6	55.5	63.5	71.4
	36	7.99	16.0	24.0	32.0	40.0	48.0	56.0	63.9	71.9
	38	8.05	16.1	24.2	32.2	40.3	48.3	56.4	64.4	72.5
	40	8.11	16.2	24.3	32.4	40.5	48.6	56.8	64.9	73.0
	42	8.17	16.3	24.5	32.7	40.8	49.0	57.2	65.3	73.5
	44	8.22	16.4	24.7	32.9	41.1	49.3	57.6	65.8	74.0
	46	8.28	16.6	24.8	33.1	41.4	49.7	58.0	66.2	74.5
	48	8.34	16.7	25.0	33.4	41.7	50.0	58.4	66.7	75.0
	50	8.40	16.8	25.2	33.6	42.0	50.4	58.8	67.2	75.6
	52	8.45	16.9	25.4	33.8	42.3	50.7	59.2	67.6	76.1
	54	8.51	17.0	25.5	34.0	42.6	51.1	59.6	68.1	76.6
	56	8.57	17.1	25.7	34.3	42.8	51.4	60.0	68.5	77.1
	58	8.63	17.3	25.9	34.5	43.1	51.8	60.4	69.0	77.6
	60	8.68	17.4	26.0	34.7	43.4	52.1	60.8	69.5	78.1
Horizontal dist.		*99.2*	*198.3*	*297.7*	*397.0*	*496.2*	*595.4*	*694.7*	*793.9*	*893.0*
5°	2′	8.74	17.5	26.2	35.0	43.7	52.4	61.2	69.9	78.7
	4	8.80	17.6	26.4	35.2	44.0	52.8	61.6	70.4	79.2
	6	8.85	17.7	26.6	35.4	44.3	53.1	62.0	70.8	79.7
	8	8.91	17.8	26.7	35.6	44.6	53.5	62.4	71.3	80.2
	10	8.97	17.9	26.9	35.9	44.8	53.8	62.8	71.7	80.7
	12	9.03	18.1	27.1	36.1	45.1	54.2	63.2	72.2	81.2
	14	9.08	18.2	27.2	36.3	45.4	54.5	63.6	72.7	81.7
	16	9.14	18.3	27.4	36.6	45.7	54.8	64.0	73.1	82.3
	18	9.20	18.4	27.6	36.8	46.0	55.2	64.4	73.6	82.8
	20	9.25	18.5	27.8	37.0	46.3	55.5	64.8	74.0	83.3
	22	9.31	18.6	27.9	37.2	46.6	55.9	65.2	74.5	83.8
	24	9.37	18.7	28.1	37.5	46.8	56.2	65.6	74.9	84.3
	26	9.43	18.9	28.3	37.7	47.1	56.6	66.0	75.4	84.8
	28	9.48	19.0	28.4	37.9	47.4	56.9	66.4	75.9	85.3
	30	9.54	19.1	28.6	38.2	47.7	57.2	66.8	76.3	85.9
	32	9.60	19.2	28.8	38.4	48.0	57.6	67.2	76.8	86.4
	34	9.65	19.3	29.0	38.6	48.3	57.9	67.6	77.2	86.9
	36	9.71	19.4	29.1	38.8	48.6	58.3	68.0	77.7	87.4
	38	9.77	19.5	29.3	39.1	48.8	58.6	68.4	78.1	87.9
	40	9.83	19.7	29.5	39.3	49.1	59.0	68.8	78.6	88.4
	42	9.88	19.8	29.6	39.5	49.4	59.3	69.2	79.0	88.9
	44	9.94	19.9	29.8	39.8	49.7	59.6	69.6	79.5	89.4
	46	10.00	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
	48	10.05	20.1	30.2	40.2	50.3	60.3	70.4	80.4	90.5
	50	10.11	20.2	30.3	40.4	50.5	60.7	70.8	80.9	91.0
	52	10.17	20.3	30.5	40.7	50.8	61.0	71.2	81.3	91.5
	54	10.22	20.4	30.7	40.9	51.1	61.3	71.6	81.8	92.0
	56	10.28	20.6	30.8	41.1	51.4	61.7	72.0	82.2	92.5
	58	10.33	20.7	31.0	41.4	51.7	62.0	72.4	82.7	93.0
	60	10.40	20.8	31.2	41.6	52.0	62.4	72.8	83.2	93.6
Horizontal dist.		*98.9*	*197.8*	*296.7*	*395.6*	*494.5*	*593.3*	*692.4*	*791.3*	*890.2*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
6°	2′	10.45	20.9	31.4	41.8	52.3	62.7	73.2	83.6	94.1
	4	10.51	21.0	31.5	42.0	52.5	63.1	73.6	84.1	94.6
	6	10.57	21.1	31.7	42.3	52.8	63.4	74.0	84.5	95.1
	8	10.62	21.2	31.9	42.5	53.1	63.7	74.4	85.0	95.6
	10	10.68	21.4	32.0	42.7	53.4	64.0	74.8	85.4	96.1
	12	10.74	21.5	32.2	42.9	53.7	64.4	75.2	85.9	96.6
	14	10.79	21.6	32.4	43.2	54.0	64.8	75.5	86.3	97.1
	16	10.85	21.7	32.5	43.4	54.2	65.1	75.9	86.8	97.6
	18	10.91	21.8	32.7	43.6	54.5	65.4	76.3	87.2	98.2
	20	10.96	21.9	32.9	43.8	54.8	65.8	76.7	87.7	98.7
	22	11.02	22.0	33.1	44.1	55.1	66.1	77.1	88.2	99.2
	24	11.08	22.2	33.2	44.3	55.4	66.5	77.5	88.6	99.7
	26	11.13	22.3	33.4	44.5	55.6	66.8	77.9	89.1	100.2
	28	11.19	22.4	33.6	44.8	55.9	67.1	78.3	89.5	100.7
	30	11.25	22.5	33.7	45.0	56.2	67.5	78.7	90.0	101.2
	32	11.30	22.6	33.9	45.2	56.5	67.8	79.1	90.4	101.7
	34	11.36	22.7	34.1	45.4	56.8	68.2	79.5	90.9	102.2
	36	11.42	22.8	34.2	45.7	57.1	68.5	79.9	91.3	102.7
	38	11.47	22.9	34.4	45.9	57.4	68.8	80.3	91.8	103.2
	40	11.53	23.1	34.6	46.1	57.6	69.2	80.7	92.2	103.8
	42	11.59	23.2	34.8	46.3	57.9	69.5	81.1	92.7	104.3
	44	11.64	23.3	34.9	46.6	58.2	69.9	81.5	93.1	104.8
	46	11.70	23.4	35.1	46.8	58.5	70.2	81.9	93.6	105.3
	48	11.76	23.5	35.3	47.0	58.8	70.5	82.3	94.0	105.8
	50	11.81	23.6	35.4	47.2	59.1	70.9	82.7	94.5	106.3
	52	11.87	23.7	35.6	47.5	59.3	71.2	83.1	95.0	106.8
	54	11.93	23.9	35.8	47.7	59.6	71.6	83.5	95.4	107.3
	56	11.98	24.0	35.9	47.9	59.9	71.9	83.9	95.9	107.8
	58	12.04	24.1	36.1	48.2	60.2	72.2	84.3	96.3	108.4
	60	12.10	24.2	36.3	48.4	60.5	72.6	84.7	96.8	108.9
Horizontal dist.		*98.5*	*197.0*	*295.5*	*394.0*	*492.6*	*591.1*	*689.6*	*788.1*	*886.6*
7°	2′	12.15	24.3	36.5	48.6	60.8	72.9	85.1	97.2	109.4
	4	12.21	24.4	36.6	48.8	61.0	73.2	85.5	97.7	109.9
	6	12.26	24.5	36.8	49.1	61.3	73.6	85.8	98.1	110.4
	8	12.32	24.6	37.0	49.3	61.6	73.9	86.2	98.6	110.9
	10	12.38	24.8	37.1	49.5	61.9	74.3	86.6	99.0	111.4
	12	12.43	24.9	37.3	49.7	62.2	74.6	87.0	99.5	111.9
	14	12.49	25.0	37.5	50.0	62.4	74.9	87.4	99.9	112.4
	16	12.55	26.1	37.6	50.2	62.7	75.3	87.8	100.4	112.9
	18	12.60	25.2	37.8	50.4	63.0	75.6	88.2	100.8	113.4
	20	12.66	25.3	38.0	50.6	63.3	75.9	88.6	101.3	113.9
	22	12.71	25.4	38.1	50.9	63.6	76.3	89.0	101.7	114.4
	24	12.77	25.5	38.3	51.1	63.8	76.6	89.4	102.2	114.9
	26	12.83	25.7	38.5	51.3	64.1	77.0	89.8	102.6	115.4
	28	12.88	25.8	38.6	51.5	64.4	77.3	90.2	103.1	115.9
	30	12.94	25.9	38.8	51.8	64.7	77.6	90.6	103.5	116.4
	32	13.00	26.0	39.0	52.0	65.0	78.0	91.0	104.0	117.0
	34	13.05	26.1	39.2	52.2	65.3	78.3	91.4	104.4	117.5
	36	13.11	26.2	39.3	52.4	65.5	78.6	91.7	104.9	118.0
	38	13.16	26.3	39.5	52.7	65.8	79.0	92.1	105.3	118.5
	40	13.22	26.4	39.7	52.9	66.1	79.3	92.5	105.8	119.0
	42	13.28	26.6	39.8	53.1	66.4	79.7	92.9	106.2	119.5
	44	13.33	26.7	40.0	53.3	66.7	80.0	93.2	106.7	120.0
	46	13.39	26.8	40.2	53.6	66.9	80.3	93.7	107.1	120.5
	48	13.44	26.9	40.3	53.8	67.2	80.7	94.1	107.6	121.0
	50	13.50	27.0	40.5	54.0	67.5	81.0	94.5	108.0	121.5
	52	13.56	27.1	40.7	54.2	67.8	81.3	94.9	108.5	122.0
	54	13.61	27.2	40.8	54.5	68.1	81.7	95.3	108.9	122.5
	56	13.67	27.3	41.0	54.7	68.3	82.0	95.7	109.4	123.0
	58	13.73	27.5	41.2	54.9	68.6	82.3	96.1	109.8	123.5
	60	13.78	27.6	41.3	55.1	68.9	82.7	96.4	110.3	124.0
Horizontal dist.		*98.1*	*196.1*	*294.2*	*392.2*	*490.3*	*588.4*	*686.4*	*784.5*	*882.6*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
8°	5′	13.92	27.8	41.8	55.7	69.6	83.5	97.4	111.4	125.3
	10	14.06	28.1	42.2	56.2	70.3	84.4	98.4	112.5	126.6
	15	14.20	28.4	42.6	56.8	71.0	85.2	99.4	113.6	127.8
	20	14.34	28.7	43.0	57.4	71.7	86.0	100.4	114.7	129.1
	25	14.48	29.0	43.4	57.9	72.4	86.9	101.4	115.8	130.3
	30	14.62	29.2	43.9	58.5	73.1	87.7	102.3	116.9	131.6
	35	14.76	29.5	44.2	59.0	73.7	88.4	103.1	117.8	132.5
	40	14.90	29.8	44.7	59.6	74.5	89.4	104.3	119.2	134.1
	45	15.04	30.1	45.1	60.1	75.2	90.2	105.2	120.3	135.3
	50	15.17	30.3	45.5	60.7	75.9	91.0	106.2	121.4	136.6
	55	15.31	30.6	45.9	61.2	76.6	91.9	107.2	122.5	137.8
	60	15.45	30.9	46.4	61.8	77.3	92.7	108.2	123.6	139.1
Horizontal dist.		*97.5*	*195.1*	*292.7*	*390.2*	*487.8*	*585.3*	*682.9*	*780.4*	*878.0*
9°	5′	15.59	31.2	46.8	62.4	77.9	93.5	109.1	124.7	140.3
	10	15.73	31.5	47.2	62.9	78.6	94.5	110.2	125.9	141.6
	15	15.86	31.7	47.6	63.5	79.3	95.2	111.1	126.9	142.8
	20	16.00	32.0	48.0	64.0	80.0	96.0	112.0	128.0	144.0
	25	16.14	32.3	48.4	64.6	80.7	96.8	113.0	129.0	145.3
	30	16.28	32.6	48.8	65.1	81.4	97.7	113.9	130.2	146.5
	35	16.42	32.8	49.2	65.7	82.1	98.5	114.9	131.3	147.7
	40	16.55	33.1	49.7	66.2	82.8	99.3	115.9	132.4	148.0
	45	16.69	33.4	50.1	66.8	83.5	100.1	116.8	133.5	150.2
	50	16.83	33.7	50.5	67.3	84.4	101.0	117.8	134.6	151.4
	55	16.96	33.9	50.9	67.9	84.8	101.8	118.7	135.7	152.7
	60	17.10	34.2	51.3	68.4	85.5	102.6	119.7	136.8	153.9
Horizontal dist.		*97.0*	*194.0*	*291.0*	*387.9*	*484.9*	*581.9*	*678.9*	*775.9*	*872.9*
10°	5′	17.24	34.5	51.7	68.9	86.2	103.4	120.7	137.9	155.1
	10	17.37	34.7	52.1	69.5	86.9	104.2	121.6	139.0	156.4
	15	17.51	35.0	52.5	70.0	87.6	105.1	122.6	140.1	157.6
	20	17.65	35.3	52.9	70.6	88.2	105.9	123.5	141.2	158.8
	25	17.78	35.6	53.3	71.1	88.9	106.7	124.5	142.3	160.0
	30	17.92	35.8	53.8	71.7	89.6	107.5	125.4	143.3	161.3
	35	18.05	36.1	54.2	72.2	90.3	108.3	126.4	144.4	162.5
	40	18.19	36.4	54.6	72.7	90.9	109.1	127.3	145.5	163.7
	45	18.37	36.6	55.0	73.4	91.8	110.1	128.5	146.9	165.3
	50	18.46	36.9	55.4	73.8	92.3	110.8	129.2	147.7	166.1
	55	18.60	37.2	55.8	74.4	93.0	111.6	130.2	148.8	167.4
	60	18.73	37.5	56.2	74.9	93.7	112.4	131.1	149.8	168.5
Horizontal dist.		*96.4*	*192.7*	*289.1*	*385.4*	*481.8*	*578.2*	*674.5*	*770.9*	*867.7*
11°	5′	18.86	37.7	56.6	75.5	94.3	113.2	132.1	150.9	169.8
	10	19.00	38.0	57.0	76.0	95.0	114.0	133.0	152.0	171.0
	15	19.13	38.3	57.4	76.5	95.7	114.8	133.9	153.1	172.2
	20	19.27	38.5	57.8	77.1	96.3	115.6	134.9	154.1	173.4
	25	19.40	38.8	58.2	77.6	97.0	116.4	135.8	155.2	174.6
	30	19.54	39.1	58.6	78.1	97.7	117.2	136.8	156.3	175.8
	35	19.67	39.3	59.0	78.7	98.4	118.0	137.7	157.4	177.0
	40	19.80	39.6	59.4	79.2	99.0	118.8	138.6	158.4	178.2
	45	19.94	39.9	59.8	79.7	99.7	119.6	139.6	159.5	179.4
	50	20.07	40.1	60.2	80.3	100.4	120.4	140.5	160.6	180.6
	55	20.20	40.4	60.6	80.8	101.0	121.2	141.4	161.6	181.8
	60	20.34	40.7	61.0	81.4	101.7	122.0	142.4	162.7	183.0
Horizontal dist.		*95.7*	*191.3*	*287.0*	*382.7*	*478.4*	*574.1*	*669.7*	*765.4*	*861.1*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
12°	5′	20.47	40.9	61.4	81.9	102.3	122.8	143.3	163.8	184.2
	10	20.60	41.2	61.8	82.4	103.0	123.6	144.2	164.8	185.4
	15	20.73	41.5	62.2	82.9	103.7	124.4	145.1	165.9	186.6
	20	20.87	41.7	62.6	83.5	104.3	125.2	146.1	166.9	187.8
	25	21.00	42.0	63.0	84.0	105.0	126.0	147.0	168.0	189.0
	30	21.13	42.3	63.4	84.5	105.7	126.8	147.9	169.0	190.2
	35	21.26	42.5	63.8	85.1	106.3	127.6	148.8	170.1	191.4
	40	21.39	42.8	64.2	85.6	107.0	128.4	149.8	171.2	192.5
	45	21.52	43.1	64.6	86.1	107.6	129.2	150.7	172.2	193.7
	50	21.66	43.3	65.0	86.6	108.3	129.9	151.6	173.2	194.9
	55	21.79	43.6	65.4	87.2	108.9	130.7	152.5	174.3	196.1
	60	21.92	43.8	65.7	87.7	109.6	131.5	153.4	175.3	197.3
Horizontal dist.		*94.9*	*189.9*	*284.8*	*379.8*	*474.7*	*569.6*	*664.6*	*759.5*	*854.5*
13°	5′	22.05	44.1	66.1	88.2	110.2	132.3	154.3	176.3	198.4
	10	22.18	44.4	66.5	88.7	110.9	133.1	155.3	177.4	199.6
	15	22.31	44.6	66.9	89.2	111.6	133.9	156.2	178.5	200.8
	20	22.44	44.9	67.3	89.8	112.2	134.6	157.1	179.5	202.0
	25	22.57	45.1	67.7	90.3	112.8	135.4	158.0	180.6	203.1
	30	22.70	45.4	68.1	90.8	113.5	136.2	158.9	181.6	204.3
	35	22.83	45.7	68.5	91.3	114.1	137.0	159.8	182.6	205.5
	40	22.96	45.9	68.9	91.8	114.8	137.7	160.7	183.7	206.6
	45	23.09	46.2	69.3	92.4	115.4	138.5	161.6	184.7	207.8
	50	23.22	46.4	69.6	92.9	116.1	139.3	162.5	185.7	208.9
	55	23.35	46.7	70.0	93.4	116.7	140.1	163.4	186.8	210.1
	60	23·47	46.9	70.4	93.9	117.4	140.8	164.3	187.8	211.3
Horizontal dist.		*94.2*	*188.3*	*282.4*	*376.6*	*470.7*	*564.9*	*659.0*	*753.2*	*847.3*
14°	5′	23.60	47.2	70.8	94.4	118.0	141.6	165.2	188.8	212.4
	10	23.73	47.5	71.2	94.9	118.6	142.4	166.1	189.8	213.6
	15	23.86	47.7	71.6	95.4	119.3	143.2	167.0	190.9	214.7
	20	23.99	48.0	72.0	95.9	119.9	143.9	167.9	191.9	215.9
	25	24.11	48.2	72.3	96.5	120.6	144.7	168.8	192.9	217.0
	30	24.24	48.5	72.7	97.0	121.2	145.4	169.7	193.9	218.2
	35	24.37	48.7	73.1	97.5	121.8	146.2	170.6	194.9	219.3
	40	24.49	49.0	73.5	98.0	122.5	147.0	171.5	196.0	220.4
	45	24.62	49.2	73.9	98.5	123.1	147.7	172.3	197.0	221.6
	50	24.75	49.5	74.2	99.0	123.7	148.5	173.2	198.0	222.7
	55	24.87	49.7	74.6	99.5	124.4	149.2	174.1	199.0	223.9
	60	25.00	50.0	75.0	100.0	125.0	150.0	175.0	200.0	225.0
Horizontal dist.		*93.3*	*186.6*	*279.9*	*373.2*	*466.5*	*559.8*	*653.1*	*746.4*	*839.7*
15°	5′	25.13	50.3	75.4	100.5	125.6	150.8	175.9	201.0	226.1
	10	25.25	50.5	75.8	101.0	126.3	151.5	176.8	202.0	227.3
	15	25.38	50.8	76.1	101.5	126.9	152.3	177.6	203.0	228.4
	20	25.50	51.0	76.5	102.0	127.5	153.0	178.5	204.0	229.5
	25	25.63	51.3	76.9	102.5	128.1	153.8	179.4	205.0	230.6
	30	25.75	51.5	77.3	103.0	128.8	154.5	180.3	206.0	231.8
	35	25.88	51.8	77.6	103.5	129.4	155.3	181.1	207.0	232.9
	40	26.00	52.0	78.0	104.0	130.0	156.0	182.0	208.0	234.0
	45	26.12	52.2	78.4	104.5	130.6	156.7	182.9	209.0	235.1
	50	26.25	52.5	78.7	105.0	131.2	157.5	183.7	210.0	236.2
	55	26.37	52.7	79.1	105.5	131.9	158.2	184.6	211.0	237.4
	60	26.50	53.0	79.5	106.0	132.5	159.0	185.5	212.0	238.5
Horizontal dist		*92.4*	*184.8*	*277.2*	*369.6*	*462.0*	*554.4*	*646.8*	*739.2*	*831.6*

Table 46.—*Stadia Table*—Continued.

Slant distance		100	200	300	400	500	600	700	800	900
16°	5′	26.62	53.2	79.9	106.5	133.1	159.7	186.3	213.0	239.6
	10	26.74	53.5	80.2	107.0	133.7	160.5	187.2	213.9	240.7
	15	26.86	53.7	80.6	107.5	134.3	161.2	188.0	214.9	241.8
	20	26.99	54.0	81.0	108.0	134.9	161.9	188.9	215.9	242.9
	25	27.11	54.2	81.3	108.4	135.6	162.7	189.8	216.9	244.0
	30	27.23	54.5	81.7	108.9	136.2	163.4	190.6	217.9	245.1
	35	27.35	54.7	82.1	109.4	136.8	164.1	191.5	218.8	246.2
	40	27.48	55.0	82.4	109.9	137.4	164.9	192.4	219.8	247.3
	45	27.60	55.2	82.8	110.4	138.0	165.6	193.2	220.8	248.4
	50	27.72	55.4	83.2	110.9	138.6	166.3	194.0	221.7	249.5
	55	27.84	55.7	83.5	111.4	139.2	167.0	194.9	222.7	250.6
	60	27.96	55.9	83.9	111.8	139.8	167.8	195.7	223.7	251.6
Horizontal dist.		*91.4*	*183*	*274*	*366*	*457*	*549*	*640*	*732*	*823*
17°	5′	28.08	56.2	84.2	112.3	140.4	168.5	196.6	224.6	252.7
	10	28.20	56.4	84.6	112.8	141.0	169.2	197.4	225.6	253.8
	15	28.32	56.6	85.0	113.3	141.6	169.9	198.2	226.6	254.9
	20	28.44	56.9	85.3	113.8	142.2	170.6	199.1	227.5	256.0
	25	28.56	57.1	85.7	114.2	142.8	171.4	199.9	228.5	257.0
	30	28.68	57.4	86.0	114.7	143.4	172.1	200.8	229.4	258.1
	35	28.80	57.6	86.4	115.2	144.0	172.8	201.6	230.4	259.2
	40	28.92	57.8	86.7	115.7	144.6	173.5	202.4	231.3	260.2
	45	29.04	58.1	87.1	116.1	145.2	174.2	203.2	232.3	261.3
	50	29.15	58.3	87.5	116.6	145.8	174.9	204.1	233.2	262.4
	55	29.27	58.5	87.8	117.1	146.4	175.6	204.9	234.2	263.4
	60	29.39	58.8	88.2	117.6	146.9	176.3	205.7	235.1	264.5
Horizontal dist.		*90.4*	*181*	*271*	*362*	*452*	*543*	*633*	*724*	*814*
18°	5′	29.51	59.0	88.5	118.0	147.5	177.0	206.5	236.1	265.6
	10	29.62	59.2	88.9	118.5	148.1	177.7	207.4	237.0	266.6
	15	29.74	59.5	89.2	119.0	148.7	178.4	208.2	237.9	267.7
	20	29.86	59.7	89.6	119.4	149.3	179.1	209.0	238.9	268.7
	25	29.97	59.9	89.9	119.9	149.9	179.8	209.8	239.8	269.8
	30	30.09	60.2	90.3	120.4	150.5	180.5	210.6	240.7	270.8
	35	30.21	60.4	90.6	120.8	151.0	181.2	211.4	241.7	271.9
	40	30.32	60.6	91.0	121.3	151.6	181.9	212.3	242.6	272.9
	45	30.44	60.9	91.3	121.8	152.2	182.6	213.1	243.5	273.9
	50	30.55	61.1	91.7	122.2	152.8	183.3	213.9	244.4	275.0
	55	30.67	61.3	92.0	122.7	153.3	184.0	214.7	245.4	276.0
	60	30.78	61.6	92.3	123.1	153.9	184.7	215.5	246.3	277.0
Horizontal dist.		*89.4*	*179*	*268*	*358*	*447*	*536*	*626*	*715*	*805*
19°	5′	30.90	61.8	92.7	123.6	154.5	185.4	216.3	247.2	278.1
	10	31.01	62.0	93.0	124.0	155.1	186.1	217.1	248.1	279.1
	15	31.12	62.3	93.4	124.5	155.6	186.8	217.9	249.0	280.1
	20	31.24	62.5	93.7	125.0	156.2	187.4	218.7	249.9	281.2
	25	31.35	62.7	94.1	125.4	156.8	188.1	219.5	250.8	282.2
	30	31.47	62.9	94.4	125.9	157.3	188.8	220.3	251.7	283.2
	35	31.58	63.2	94.7	126.3	157.9	189.5	221.1	252.6	284.2
	40	31.69	63.4	95.1	126.8	158.5	190.1	221.8	253.5	285.2
	45	31.80	63.6	95.4	127.2	159.0	190.8	222.6	254.4	286.2
	50	31.92	63.8	95.7	127.7	159.6	191.5	223.4	255.3	287.2
	55	32.03	64.1	96.1	128.1	160.1	192.2	224.2	256.2	288.2
	60	32.14	64.3	96.4	128.6	160.7	192.8	225.0	257.1	289.2
Horizontal dist.		*88.3*	*177*	*265*	*353*	*442*	*530*	*618*	*706*	*795*

Table 47.—*Values of c for use in the Chezy formula $v=c\sqrt{rs}$.*

r \ n	.009	.010	.011	.012	.013	.014	.015	.017	.020	.0225	.025	.030	.035	.040
Slope $s = .00005 = 1$ in $20,000 = 0.264$ feet per mile.														
.1	78	67	59	52	47	43	39	33	28	22	20	16	13	11
.2	100	87	77	68	62	56	51	44	35	30	26	21	18	15
.3	114	99	88	79	71	65	59	50	41	36	31	25	21	18
.4	124	109	97	88	79	72	66	57	46	40	35	28	24	20
.6	139	122	109	98	90	82	76	65	53	46	41	33	28	24
.8	150	133	119	107	98	90	83	71	59	52	46	37	31	27
1.0	158	140	126	114	104	96	89	77	64	56	49	40	34	29
1.5	178	154	139	126	116	107	99	87	72	64	57	47	40	34
2	184	164	148	135	124	115	107	94	79	70	62	51	44	38
3	198	178	161	148	136	127	118	104	88	79	71	59	50	44
*3.28	201	181	164	151	139	129	121	106	91	81	72	60	52	46
4	207	187	170	156	145	135	126	111	96	85	77	64	56	49
6	220	199	182	168	156	146	137	122	105	94	85	72	63	56
10	234	212	195	181	169	158	149	134	116	105	96	82	72	64
20	250	228	211	196	184	174	165	149	131	120	110	96	85	77
50	266	245	228	213	201	190	181	165	148	136	127	113	101	93
100	275	254	237	222	210	200	190	175	158	146	137	128	112	104
Slope $s = .0001 = 1$ in $10,000 = 0.528$ feet per mile.														
.1	90	78	68	60	54	49	44	37	30	25	22	17	14	12
.2	112	98	86	76	69	63	57	48	39	33	29	23	19	16
.3	125	109	97	87	78	72	65	56	45	39	34	27	22	19
.4	136	119	106	95	86	79	72	62	50	43	38	31	25	22
.6	149	131	118	105	96	88	81	70	57	50	44	35	30	25
.8	158	140	126	114	103	95	88	76	63	55	48	39	33	28
1.0	166	147	132	120	109	101	93	81	67	59	52	42	35	31
1.5	178	159	144	130	120	111	103	89	75	66	59	48	41	35
2	187	168	151	138	127	118	109	96	81	71	64	53	45	39
3	198	178	162	149	137	127	119	104	89	79	71	59	51	45
4	206	186	169	155	143	134	125	111	94	84	76	64	55	49
6	215	195	178	164	152	142	134	119	102	92	84	71	61	54
10	226	205	188	174	162	152	143	128	111	100	92	78	69	62
20	237	216	200	185	173	163	154	139	122	111	102	89	79	71
50	249	227	211	197	185	175	166	151	134	123	114	100	91	83
100	255	234	218	204	191	181	172	158	140	130	121	108	98	91
Slope $s = .0002 = 1$ in $5,000 = 1.056$ feet per mile.														
.1	99	85	74	65	59	53	48	41	32	27	24	18	15	12
.2	121	105	93	83	74	67	61	52	42	36	31	25	21	17
.3	133	116	103	92	83	76	69	59	48	42	36	29	24	20
.4	143	125	112	100	91	83	76	65	53	46	40	32	27	23
.6	155	138	122	111	100	92	85	73	60	52	46	37	31	26
.8	164	145	131	118	107	99	91	79	65	57	50	41	34	29
1.0	170	151	136	123	113	104	96	83	69	60	54	44	37	32
1.5	181	162	146	133	122	113	105	91	77	67	60	49	42	36
2	188	170	154	140	129	119	111	97	82	72	64	54	45	40
3	200	179	163	149	137	128	119	105	89	79	72	59	51	45
4	205	185	168	155	143	133	125	111	94	84	76	63	55	48
6	213	198	176	162	150	140	132	117	100	90	82	69	60	53
10	222	201	185	170	156	148	140	125	108	98	89	76	67	60
20	231	210	194	180	168	158	149	134	117	106	98	85	76	68
50	240	220	206	189	177	167	158	148	126	116	108	94	85	78
100	245	224	208	194	182	172	163	148	131	121	113	99	90	83

*Values of c are the same for all slopes when $r=3.28$ feet.

Table 47.—*Values of c for use in the Chezy formula* $v = c\sqrt{r\,s}$ —Continued.

r \ s	.009	.010	.011	.012	.013	.014	.015	.017	.020	.0225	.025	.030	.035	.040
Slope $s = .0004 = 1$ in $2{,}500 = 2.112$ feet per mile.														
.1	104	89	78	69	62	56	50	43	34	29	25	19	16	13
.2	126	110	97	87	78	71	65	54	44	37	32	25	21	18
.3	138	120	107	96	87	79	73	62	50	43	37	30	24	21
.4	148	129	115	104	94	86	79	68	55	47	42	33	27	23
.6	157	140	126	113	103	95	87	75	62	54	47	38	31	27
.8	166	148	133	121	110	101	93	81	67	58	51	42	35	30
1.0	172	154	138	125	115	106	98	85	70	62	55	45	37	32
1.5	183	164	148	135	124	114	106	93	78	68	61	50	42	37
2	190	170	154	141	130	120	112	98	83	73	65	54	45	40
3	199	179	162	149	138	128	119	105	89	79	71	59	51	45
4	204	184	168	154	142	133	124	110	94	84	76	63	55	48
6	211	191	175	161	149	139	130	116	99	89	81	69	60	53
10	219	199	183	168	157	146	138	123	107	96	88	75	66	59
20	227	207	190	176	164	154	146	131	115	104	96	83	73	66
50	235	215	198	184	173	162	154	139	123	112	104	91	82	75
100	239	219	203	189	177	167	158	143	127	116	108	96	87	80
Slope $s = .001 = 1$ in $1{,}000 = 5.28$ feet per mile.														
.1	110	94	83	73	65	59	54	45	36	30	27	21	17	14
.2	129	113	99	89	81	73	66	57	45	39	34	27	22	18
.3	141	124	109	98	89	81	74	63	51	44	39	30	25	21
.4	150	131	117	105	96	88	80	69	56	48	43	34	28	24
.6	161	142	127	115	104	96	88	76	63	55	48	39	32	27
.8	169	150	134	122	111	102	94	82	68	59	52	42	35	30
1.0	175	155	139	127	116	107	99	86	71	62	56	45	38	33
1.5	184	165	149	136	124	115	106	93	78	69	62	50	43	37
2	191	171	155	142	130	121	112	98	83	73	66	54	46	40
3	199	179	163	149	138	128	119	105	89	79	71	59	51	45
4	204	184	168	154	142	133	124	110	93	83	75	63	54	48
6	211	190	174	160	149	139	130	116	99	89	81	68	59	52
10	218	197	181	167	155	145	136	122	105	95	87	74	65	58
20	225	205	188	175	163	153	144	129	113	102	94	81	72	65
50	232	212	196	182	170	160	151	137	120	110	101	89	79	72
100	236	216	200	186	174	164	155	141	124	114	105	94	85	77
Slope $s = .01 = 1$ in $100 = 52.8$ feet per mile.														
.1	110	95	83	74	66	60	54	46	36	31	27	21	17	14
.2	130	114	100	90	81	74	67	57	46	39	34	27	22	19
.3	143	125	111	100	90	83	76	64	52	45	39	31	25	22
.4	151	133	119	107	98	89	82	70	57	49	44	35	29	24
.6	162	143	129	116	106	98	90	77	64	55	49	39	33	28
.8	170	151	135	123	112	103	95	82	68	60	53	43	35	31
1.0	175	156	141	128	117	108	99	87	72	63	56	45	38	33
1.5	185	165	149	136	125	116	107	94	79	69	62	51	43	37
2	191	171	155	142	130	121	112	99	83	74	66	55	46	40
3	199	179	162	149	138	128	119	105	89	79	71	59	51	45
4	204	184	167	154	142	132	123	109	93	83	76	63	55	48
6	210	190	173	160	148	138	129	115	99	88	81	68	59	52
10	217	196	180	166	154	145	136	121	105	94	86	74	65	58
20	225	204	187	173	161	152	143	128	112	101	93	80	71	64
50	231	210	194	181	168	158	150	135	119	108	100	87	78	71
100	235	214	197	184	172	162	153	139	122	112	104	91	82	75

NOTE.—For slopes greater than .01, c remains nearly constant.

Table 48.—*Average weight, in pounds per cubic foot, of various substances.*

Substance	Weight
Clay, earth and mud	
Clay	122–162
Earth, dry and loose	72–80
" " " shaken	82–92
" " " moderately rammed	90–100
Earth, slightly moist, loose	70–76
" more moist, loose	66–68
" " " shaken	75–90
" " " moderately rammed	90–100
Earth, as soft flowing mud	104–112
" " " mud well pressed into a box	110–120
Mud, dry, close	80–110
" wet, moderately pressed	110–130
Mud, wet, fluid	104–120
Masonry and its materials	
Brick, best pressed	150
" common hard	125
" soft, inferior	100
Brickwork, pressed brick, fine joints	140
Brickwork, medium quality	125
" coarse, inferior soft bricks	100
Cement, pulverized, loose	72–105
" pressed	115
" set	168–187
Concrete, 1:3:6	140
Gravel, loose	82–125
" rammed	90–145
Masonry of granite or stone of like weight	
Well dressed	165
Well–scabbled rubble, 20% mortar	154
Roughly-scabbled rubble 25% to 35% mortar	150
Well-scabbled dry rubble	138
Roughly-scabbled dry rubble	125
Masonry of sandstone or stone of like weight weighs about seven-eighths of the above.	
Mortar, hardened	90–115
Sand, pure quartz, dry, loose	87–106
Sand, pure quartz, dry, slightly shaken	92–110
Sand, pure quartz, dry, rammed	100–120
Sand, natural, dry, loose	80–110
" " " shaken	85–125

Substance	Weight
Masonry and its materials—(Continued)	
Sand, wet, voids full of water	118–128
Stone	135–195
" quarried, loosely piled	80–110
" broken, loose	77–112
" " rammed	79–121
Metals and alloys	
Brass (copper and zinc)	487–524
Bronze (copper and tin)	524–537
Copper, cast	537–548
" rolled	548–562
Iron and steel, cast	438–483
Average	450
" " " wrought	475–494
Average	481
Spelter or zinc	425–450
Tin, cast	450–470
Woods, seasoned and dry	
Ash	40–53
Hemlock	25
Hickory	37–53
Oak, white	37–56
" red, black, etc	32–45
Pine, white	22–31
" yellow, northern	30–39
" " southern	40–50
Poplar	22–31
Spruce	25
Woods weigh one-fifth to one-half more green than dry; and ordinary building timber, tolerably seasoned, weighs about one-sixth more than dry timber.	

Table 49. — *Convenient equivalents.*

LENGTH

1 inch=$\frac{1}{12}$ foot=.027778 yard=.000015783 mile=2.54 centimeters.
1 foot=12 inches=$\frac{1}{3}$ yard=.00018939 mile=.3048 meter.
1 yard=36 inches=3 feet=.00056818 mile=.9144 meter.
1 mile=63360 inches=5280 feet=1760 yards=1.60935 kilometers.
1 meter=100 centimeters=.001 kilometer=39.37 inches=3.2808 feet=1.0936 yards=.00062137 mile.

SURFACE

1 square inch=.006944 square foot=.0007716 square yard=.0000001594 acre=.0000000002491 square mile=6.45163 square centimeters.
1 square foot=144 square inches=$\frac{1}{9}$ square yard=.000022957 acre=.000000-03587 square mile=.092903 square meters.
1 square yard=1296 square inches=9 square feet=.0002066 acre=.0000003228 square mile=.83613 square meter.
1 acre=6272640 square inches=43560 square feet=4840 square yards=.0015625 square mile=208.71 feet square=.404687 hectare.
1 square mile=4014489600 square inches=27878400 square feet=3097600 square yards=640 acres=259 hectares.
1 square meter=10000 square centimeters=.0001 hectare=.000001 square kilometer=1550.00 square inches=10.7639 square feet=1.19598 square yards=.0002471 acre=.0000003861 square mile.

VOLUME

1 cubic inch=.004329 U. S. gallon=.0005787 cubic foot=16.3872 cubic centimeters.
1 U. S. gallon=231 cubic inches=.13368 cubic foot=.00000307 acre-foot=3.78543 liters.
1 cubic foot=1728 cubic inches=7.4805 U. S. gallons=.037037 cubic yard=.000022957 acre-foot=28.317 liters.
1 cubic yard=46656 cubic inches=27 cubic feet=.00061983 acre-foot=.76456 cubic meter.
1 acre-foot=325851 U. S. gallons=43560 cubic feet=1613$\frac{1}{3}$ cubic yards=1233.49 cubic meters.
1 cubic meter, stere or kiloliter=1000000 cubic centimeters=1000 liters=61023.4 cubic inches=264.17 U. S. gallons=35.3145 cubic feet=1.30794 cubic yards=.000810708 acre-foot.

HYDRAULICS

1 U. S. gallon of water weighs 8.34 pounds avoirdupois.
1 cubic foot of water weighs 62.4 pounds avoirdupois.
1 second-foot=448.8 U. S. gallons per minute=26929.9 U. S. gallons per hour=646317 U. S. gallons per day.
=60 cubic feet per minute=3600 cubic feet per hour=86400 cubic feet per day=31536000 cubic feet per year=.000214 cubic miles per year.
=.9917 acre-inch per hour=1.9835 acre-feet per day=723.9669 acre-feet per year.
=50 miner's inches in Idaho, Kansas, Nebraska, New Mexico, North Dakota, and South Dakota=40 miner's inches in Arizona, California, Montana, and Oregon=38.4 miner's inches in Colorado.
=.028317 cubic meters per second=1.699 cubic meters per minute=101.941 cubic meters per hour=2446.58 cubic meters per day.
1 cubic meter per minute=.5886 second-feet=4.403 U. S. gallons per second=1.1674 acre-feet per day.
1 million gallons per day=1.55 second-feet=3.07 acre-feet per day=2.629 cubic meters per minute.
1 second-foot falling 8.81 feet=1 horsepower.
1 second-foot falling 10 feet=1.135 horsepower.
1 second-foot falling 11 feet=1 horsepower, 80 per cent efficiency.
1 second-foot for 1 year will cover 1 square mile 1.131 feet or 13.572 inches deep.
1 inch deep on 1 square mile=2323200 cubic feet=.0737 second-feet for 1 year.

Table 49.—*Convenient equivalents*—Continued.

MISCELLANEOUS

1 foot per second=.68 mile per hour=1.097 kilometers per hour.
1 avoirdupois pound=7000 grains=.4536 kilogram.
1 kilogram=1000 grams=.001 tonne=15432 grains=2.2046 pounds avoirdupois.
1 atmosphere=about { 15 pounds per square inch. / 1 ton per square foot. / 1 kilogram per square centimeter.
Acceleration of gravity, g,=32.16 feet per second.
1 mil=.001 inch.
1 circular mil= $\frac{\pi}{4}$ $(.001)^2$ or .0000007854 square inch.
1 square inch=1273240 circular mils.
No. 10 Birmingham gage wire has a diameter of 134 mils and a cross-sectional area of 17956 circular mils.
1 horsepower=5694120 foot-gallons per day=550 foot-pounds per second=33000 foot-pounds per minute=1980000 foot-pounds per hour=2545 B. T. U. per hour=76 kilogrammeters per second=1.27 kilogrammeters per minute=746 watts.
1 horsepower, boiler rating, requires the evaporation of 34½ pounds per hour of water at 212 degrees Fahrenheit to dry steam at the same temperature; or the expenditure of 33317 B.T.U.; and in practice is developed by burning 3¼ to 4¼ pounds per hour of coal under 10 to 12 square feet of heating surface.
1 B. T. U.=778 foot-pounds.
1 pound of bituminous coal contains about 14100 B.T.U. or 11000000 foot-pounds of energy.

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